

OR  
La  
.2So8/6  
:992  
c.1

NOT FOR  
LOAN



## Draft Environmental Impact Statement

# South Tongue Point Land Exchange and Marine Industrial Park Development Project

Clatsop County, Oregon



US Fish and  
Wildlife Service



US Army Corps  
of Engineers



US General Services  
Administration



Oregon Division  
of State Lands

OREGON



DRAFT

STATE LIBRARY

**ENVIRONMENTAL IMPACT STATEMENT**

**SOUTH TONGUE POINT LAND EXCHANGE  
AND MARINE INDUSTRIAL PARK  
DEVELOPMENT PROJECT**

U.S. FISH AND WILDLIFE SERVICE  
PACIFIC REGION  
PORTLAND, OREGON

U.S. GENERAL SERVICES ADMINISTRATION  
SAN FRANCISCO, CALIFORNIA

U.S. ARMY CORPS OF ENGINEERS  
PORTLAND DISTRICT  
PORTLAND, OREGON

OREGON DIVISION OF STATE LANDS  
SALEM, OREGON

JUNE 1992

DRAFT  
ENVIRONMENTAL IMPACT STATEMENT

SOUTH TONGUE POINT LAND EXCHANGE  
AND MARINE INDUSTRIAL PARK  
DEVELOPMENT PROJECT

CLATSOP COUNTY, OREGON

Lead Agency: U.S. Department of the Interior  
Fish and Wildlife Service

Cooperating Agencies: U.S. General Services Administration

U.S. Department of the Army  
Corps of Engineers

Oregon Division of State Lands

Abstract:

This Draft Environmental Impact Statement (EIS) is prepared in compliance with National Environmental Policy Act (NEPA) and U.S. Fish and Wildlife Service (Service) NEPA procedures.

The U.S. General Services Administration (GSA) is proposing to convey approximately 105 acres of upland and submerged lands administered by the U.S. Army Corps of Engineers to the Oregon Division of State Lands (Division). In exchange for the Federal land, the Division is proposing to convey State-owned land of equal value, within the administrative boundary of the Lewis and Clark National Wildlife Refuge to GSA, which will in turn transfer those lands to the Service. The Division is proposing to develop a marine industrial park on the property conveyed to them.

More than 20 alternatives were considered before limiting the alternatives to be advanced for further study. Alternatives considered but not advanced for detailed analysis included alternative sites, development concepts, and single versus multi-tenant developments. Alternatives advanced for detailed analysis include: (A) the proposed land exchange and development of a multi-tenant marine industrial park; (B) the proposed land exchange and multi-tenant marine industrial park with a connecting road to North Tongue Point; and (C) a No Action Alternative. Alternative A is the Service's Preferred Alternative.

For further information regarding this Draft Environmental Impact Statement, contact: Mr. Benjamin Harrison, U.S. Fish and Wildlife Service, Eastside Federal Complex, 911 NE 11th Avenue, Portland, Oregon 97232-4181.



## **SUMMARY**

### **BACKGROUND**

In 1979, the U.S. Government declared the property known as South Tongue Point near Astoria, Oregon to be surplus to the Federal inventory. In 1981, the Oregon Division of State Lands (Division) contacted the Federal government regarding a possible exchange of property involving South Tongue Point and State-owned islands in the Columbia River (Figure S-1).

In May of 1989, the U.S. Navy contacted the Division regarding the possibility of homeporting two minehunter coastal craft at South Tongue Point. At the time, the Division was studying the feasibility of acquiring South Tongue Point and developing the site as a marine industrial park, in conjunction with the Federal government's proposal to exchange property with the Division. The Navy's interest led to the development of a master plan for the marine industrial park at South Tongue Point, with the Navy as the first proposed tenant.

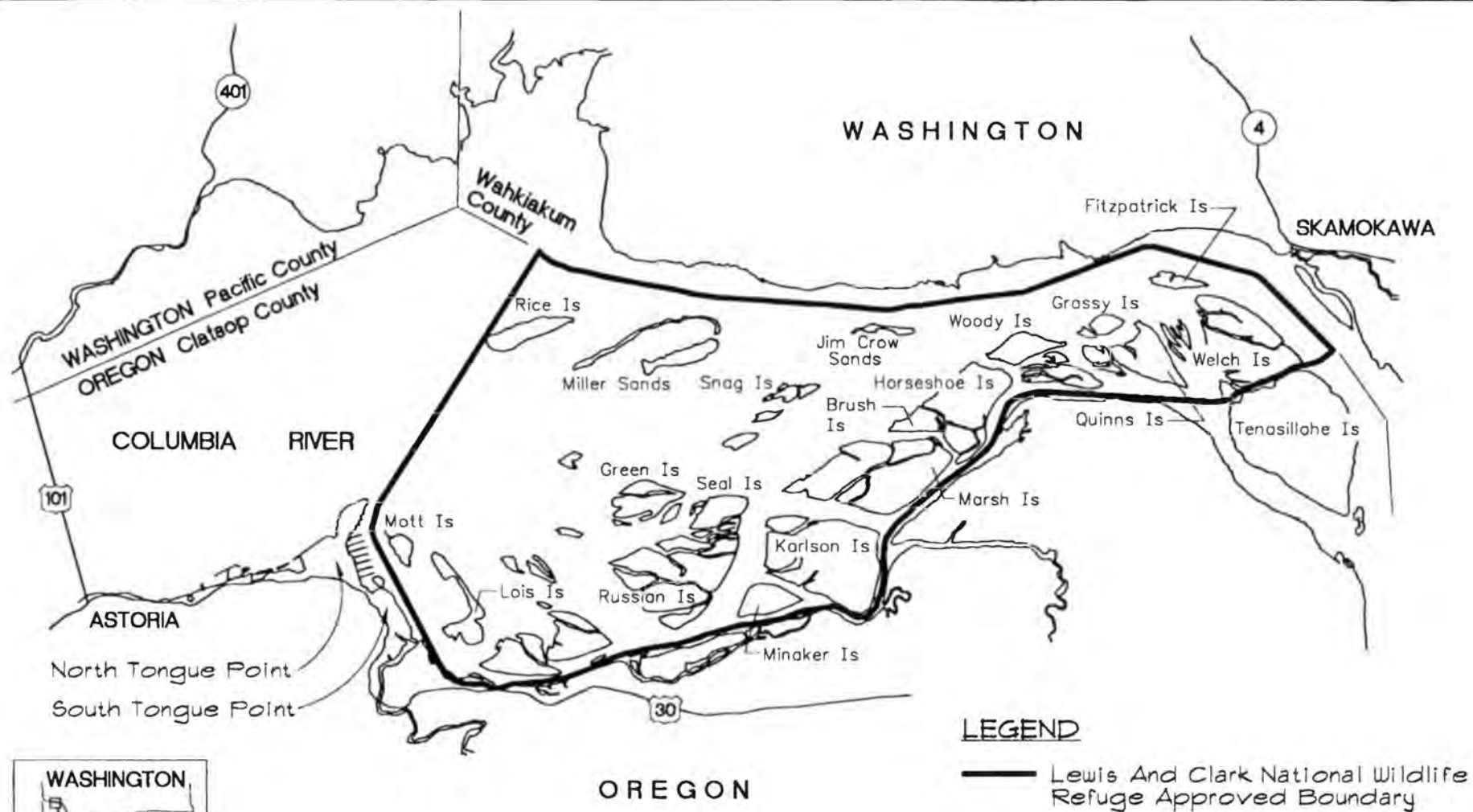
The U.S. General Services Administration (GSA) is proposing to convey approximately 105 acres of upland and submerged lands administered by the U.S. Army Corps of Engineers (Corps) to the Division. In exchange for the Federal land, the Division is proposing to convey State-owned land of equal value, within the administrative boundary of the Lewis and Clark National Wildlife Refuge (Refuge), to GSA which will in turn transfer those lands to the U.S. Fish and Wildlife Service (Service). The Division is proposing to develop a moderate-draft marine industrial park on the property conveyed to them. The Draft Environmental Impact Statement (EIS), developed by these four government agencies (Service, Corps, GSA, and Division), addresses this proposed action.

### **PURPOSE AND NEED**

#### **U.S. FISH AND WILDLIFE SERVICE**

The Service has protection responsibilities for migratory birds, threatened and endangered species, and certain anadromous fish and their habitats. Under the proposed land exchange, the Service would gain fee title ownership to certain lands within the administrative boundary of the Refuge. In order to maximize protection for migratory fish and wildlife and enhance wildlife habitats, the Service needs fee title ownership of the lands within the Refuge. Fee title ownership would provide the Service with the necessary control and management flexibility to control incompatible uses harmful to wildlife and to enhance wildlife populations and their habitats in perpetuity. The Service is the lead agency for this Draft EIS.





**Figure S - 1**  
**SOUTH TONGUE POINT**  
**PROJECT AREA**  
**SOUTH TONGUE POINT EIS**  
 June 19, 1992

## **U.S. ARMY CORPS OF ENGINEERS**

The United States under the authority of Executive Order Survey 11954, dated January 7, 1977 as amended by Executive Order Survey 12512, dated April 29, 1985, has recommended surplussing 105 acres of property administered by the Corps. The Corps has regulatory authority over activities occurring in the waters of the United States under Section 10 of the River and Harbor Act and Section 404 of the Clean Water Act.

## **U.S. GENERAL SERVICE ADMINISTRATION**

The United States under the authority of Executive Order Survey 11954, dated January 7, 1977 as amended by Executive Order Survey 12512, dated April 29, 1985, has recommended surplussing 105 acres of property administered by the Corps. GSA is the Federal agency responsible for disposing of surplus Federal lands, in this case, by negotiated exchange to the State of Oregon in accordance with Part 101-47 of the Federal Property Management Regulations (41 CFR 101-47).

## **DIVISION OF STATE LANDS**

In order to enhance the economic health of Clatsop County and the State of Oregon, the Division of State Lands, an agency of the State of Oregon, has initiated an economic development project within Clatsop County. In accordance with State of Oregon statutes and policies and regional and local economic development plans, the Division has proposed to develop a multi-tenant moderate-draft marine industrial park at South Tongue Point. This development is intended to create real property assets and associated income for the Common School Fund of the State of Oregon, and encourage new industrial employment within the South Tongue Point area.

## **DEVELOPMENT OF THE DRAFT EIS**

This Draft EIS has been developed cooperatively by the Service, Pacific Division (lead agency); Corps, Portland District; GSA, San Francisco Office; and the Division.

In the development of this Draft EIS, the Service has initiated action to assure compliance with the purpose and intent of the National Environmental Policy Act (NEPA) of 1969, as amended. Scoping activities were undertaken preparatory to developing the Draft EIS with a variety of Federal, State, and local entities (see Appendix A).

## **ALTERNATIVES ANALYZED IN THE DRAFT EIS**

More than 20 alternatives were considered before limiting the alternatives to be advanced for further study. Alternatives considered but not advanced for detailed analysis included alternative sites, development concepts, and single versus multi-tenant developments. Alternatives advanced for detailed analysis include (A) the proposed land exchange and development of a multi-tenant

marine industrial development; (B) the proposed land exchange and multi-tenant marine industrial development with connecting road to North Tongue Point; and (C) a No Action Alternative. Alternative A is the Service's Preferred Alternative.

## **ALTERNATIVE A**

Alternative A comprises two elements: (1) the land exchange, and (2) the multi-tenant marine industrial development.

1. State-owned islands within the administrative boundary of the Lewis and Clark National Wildlife Refuge would be exchanged through GSA to the Service for South Tongue Point based upon an equivalent dollar value. The existing Corps Astoria Field Station would remain on South Tongue Point.
2. Development of the multi-tenant marine industrial site would occur in two phases. Phase 1 would involve site infrastructure developments and construction of marine industrial facilities. Construction would begin in 1993 and occur at a rate supported by market conditions. The Navy is expected to be the first tenant in late 1993. Phase 2 activities may include maintenance dredging of the navigation channel to maintain existing water depths of 18 feet MLLW (mean lower low water).

## **ALTERNATIVE B**

Alternative B comprises the same two elements as Alternative A with the addition, in Phase 2, of a road connecting South Tongue Point to North Tongue Point. Construction of the connecting road would be dependent upon the need for additional land area to support marine development and increased port activities at North Tongue Point.

## **ALTERNATIVE C**

With the No Action Alternative, South Tongue Point would remain in its present undeveloped condition except for the existing Corps Field Station. There would be no land exchange. The Navy would develop a facility at another site, but not within the State of Oregon.

## **AFFECTED ENVIRONMENT**

The proposed project site is located on a peninsula created from dredge spoils in the 1950s. Except for the Corps Astoria Field Station, the peninsula is undeveloped. Infrastructure is limited to that necessary to support the Station -- an access road leads to the Station, and the Station is served by a septic drainfield. There has been some disposal of hazardous materials on South Tongue Point; however, the Corps has begun clean-up of these materials.



South Tongue Point supports dense vegetation consisting of wetland and upland species, with wildlife species typical of those habitats. The vegetation and habitat types are well-represented in the Astoria area. The area surrounding South Tongue Point is part of the foraging territory for a pair of resident bald eagles and for wintering bald eagles. Bald eagles are Federally listed as Threatened. The waters off of South Tongue Point provide aquatic habitat for several salmonid species, two of which are also Federally listed as Threatened.

South Tongue Point is zoned to allow a mixture of water-dependent and non-water-dependent uses. The Astoria area is economically depressed, with declines in the fishing and wood industries, which historically have provided the basis for the local economy.

There are no known archaeological or historical resources at South Tongue Point; one previously identified resource at the mouth of Mill Creek was reportedly destroyed in earlier construction or landfill projects.

The State-owned islands are included in estuary tidelands. Most of the islands were created or enlarged by deposition of dredge spoils. They support grassland, tidal marsh, tidal swamp, and upland forest habitats, with a wide variety of wildlife. They are also used for recreation, largely in the form of sport fishing and wildlife observation.

## **ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVES**

The following key factors were identified during the Scoping process and addressed in this Draft EIS as being potentially affected by the two proposed alternatives: (1) certain aspects of the physical environment, especially the potential for hazardous materials to be released from local sediments, (2) certain aspects of the biological environment, especially wetlands and threatened and endangered species, and (3) certain aspects of the cultural and social environment, especially the local and regional economy. These factors were also examined for the State-owned islands.

The potential consequences of the two alternatives are described in terms of adverse and beneficial impacts.

### **PHYSICAL ENVIRONMENT - SOUTH TONGUE POINT**

**No significant adverse impacts to the physical environment are expected to result from implementation of any of the Alternatives.**

Impacts to Topography, Soils, and Sediments: Under Alternatives A and B, the site would be partially cleared, grubbed, and contoured above the 100-year flood plain elevation to accommodate permanent structures or outdoor storage.

During construction of Phase 1 of Alternatives A and B, sediments would be temporarily disturbed for the placement of piles to support four new piers and a launchway, resulting in a short-term local increase in suspended sediments. The Navy pier would be built in 1993. Other piers would be built in response to market demand.

No dredging would be needed to initiate the project at South Tongue Point for either Alternative A or B, since current depths are sufficiently deep for all proposed project uses. Maintenance dredging may be required in Phase 2 to keep the access channel and turning basin at the required depth of 18 feet MLLW. Dredging would have the potential to temporarily impact water quality through increased turbidity.

Under Alternative A, impacts to wetlands have been minimized, with a total loss of 0.57 acres.

Under Alternative B, approximately 4 acres of additional wetland fill would be required for the connecting road to North Tongue Point.

Under Alternative C, there would be no changes to topography, soils or sediments.

Impacts to Groundwater and Surface Water Quality: Under Alternatives A and B, existing and future facilities would be connected to the Astoria municipal sewer system, eliminating the potential for adverse impacts to groundwater. Short-term and minor adverse impacts to surface water quality in the form of turbidity may occur during pier construction.

Adverse impacts to water quality from operational activities could occur as a result of stormwater runoff from impervious surfaces; maintenance dredging of the navigation channel and berthing areas (in Phase 2); and industrial activities of individual tenants including accidental spills. Significant impacts would not occur, however, provided that required control measures are implemented. Beneficial impacts to the groundwater quality of the area would result from the discontinuance of the Corps Astoria Field Station septic field.

Under Alternative C, no adverse water quality impacts are expected, although the Corps would not be expected to connect to the municipal sewer system.

Impacts to Air Quality: It is not expected that the uses included under any of the alternatives at South Tongue Point would have an adverse impacts on the area's presently good air quality.

Impacts from Noise and Activity: Under Alternatives A and B, noise impacts from construction would be temporary, although intermittent over approximately 7 years. Most project site uses are expected to be relatively quiet, and would be masked for the local residents by the existing traffic noises on U.S. Highway 30 and the heavy vegetation between South Tongue Point and the residences. Taken in total, the project would result in a change in noise and activity on the South Tongue Point site, but would not be a significant impact on humans.

There would be no changes in noise levels under Alternative C.

Impacts to Public Facilities Development: Under Alternatives A and B, development of public facilities would include development of a domestic water supply to South Tongue Point (which would improve water delivery to the east end of the City of Astoria and to North Tongue Point), utilities, storm drainage, and transportation infrastructure. These would be a beneficial impact of the proposed project. No changes to public facilities would result from Alternative C.

Impacts from Hazardous Materials: The Corps has recognized the existence of hazardous waste on their property at South Tongue Point and is in the process of removing the material.

For both Alternatives A and B, all tenants of South Tongue Point would be required to have a spill response plan in place. These conditions would greatly reduce the potential for a release of hazardous materials.

It is suspected that there may be hazardous wastes included within the fill at North Tongue Point in an area that would be impacted by the proposed road connection under Alternative B. Any hazardous wastes located in the fill area at North Tongue Point would be remediated prior to road construction.

Under Alternative C, the cleanup of existing hazardous materials identified as occurring on South Tongue Point would occur even if the proposed land exchange does not take place.

## **BIOLOGICAL ENVIRONMENT - SOUTH TONGUE POINT**

**Implementation of Alternative A would not result in significant adverse impacts to vegetation and fish and wildlife other than bald eagles. Adverse impacts to bald eagles from Alternative A can be mitigated to a level of less than significant.**

**Alternative B may result in significant impacts to bald eagles and wetlands which may not be mitigated to a level of less than significant.**

Vegetation: Impacts to vegetation from Alternative A would be minor, consisting mainly of temporary disturbances to photosynthesis by phytoplankton from local turbidity resulting from the construction of the piers; and the removal of 62.7 acres of upland vegetation, 0.57 acres of wetland vegetation from fill for site development, and shading from pile-supported structures.

Impacts and mitigation to plant communities resulting from implementation of Alternative B would be the same as those for Alternative A, except that Alternative B would require the

removal of approximately four acres of wetland vegetation for the Phase 2 road connection to South Tongue Point. This would be a significant impact.

Alternative C would result in the plant communities of South Tongue Point remaining in their existing condition.

Threatened, Endangered, and Sensitive Plant Species: No threatened, endangered, or sensitive plant species would be displaced by Alternative A or B.

Impacts to Fish and Wildlife: Under Alternatives A and B, minor and temporary impacts to benthic and zooplankton species and fishes, would result from increases in turbidity from the placement of piling and from Phase 2 maintenance dredging. The piers could potentially attract concentrations of amphipods and act as a food source for fishes. Areas shaded by pile-supported structures may benefit fish by providing cover from predatory birds.

Impacts to mammals and birds (other than the bald eagle) would consist of the loss of habitat. The habitat types found on South Tongue Point are very common in the Astoria area and are well represented within the Lewis and Clark National Wildlife Refuge.

No changes to fish and wildlife would result from pursuing Alternative C.

Threatened, Endangered, and Sensitive Fish and Wildlife Species: Alternative A may result in an adverse effect on the ability of bald eagles (a Federally listed Threatened species) to continue to forage in the area. The development of South Tongue Point would not result in the direct loss of essential habitat; however, the cumulative effect of activities associated with the development and subsequent land use of South Tongue Point may disrupt the wintering and resident bald eagles' foraging behavior in the vicinity of the project area. This impact can be mitigated to a level of less than significant through the implementation of measures such as erection of alternative perch sites.

Under Alternative B, the construction of the connecting road to North Tongue Point may disrupt eagle foraging in the Mill Creek embayment to the point where eagles would abandon foraging activities in this area. This would be a significant impact that could not be mitigated to a level of less than significant.

Impacts to salmonids from Alternatives A and B would consist of turbidity and shading impacts, as described above for all fish species, and would not be significant.



## CULTURAL AND SOCIAL ENVIRONMENT

**Significant direct and indirect economic benefit in terms of employment and tax revenues are expected from project development under Alternatives A and B.**

The IMPLAN (Impact Analysis for Planning) input-output model was used to estimate the population, housing, employment, and fiscal impacts of the alternatives. The socioeconomic impacts of the project are expected to extend beyond Clatsop County.

Population: For Alternatives A and B, a total permanent population increase of approximately 1,300 persons would be expected by project lease-out. Of the total increase of 1,300 persons, approximately 1,100 would be projected to reside in Clatsop County. Present population trends would continue under Alternative C.

Housing: The total permanent housing demand created under Alternatives A and B would be projected to total about 555 units by project lease-out. Given the limited availability of developable land for residential development in Astoria, it is likely that much of the housing development would occur in other areas of Clatsop County. No changes in the present housing situation would result from Alternative C.

Employment: The employment impacts of Alternatives A and B range from approximately 350 jobs during construction in project year one to a constant of 610 jobs by the project lease-out. No changes in the present employment situation would result from Alternative C.

Fiscal: At the time of project lease-out for both Alternatives A and B, State income tax revenues would be expected to run about \$400,000 per year. Both Alternatives A and B would be expected to increase property tax revenues in Clatsop County by about \$1.1 million. No changes in the present fiscal situation would result from Alternative C.

Cultural and Archaeological: None of the alternatives is expected to impact historic or archaeological resources. However, Alternative B could potentially affect archaeological resources; work would be monitored during Phase 2 to eliminate any impacts.

Visual: Alternatives A and B would result in changes to the visual aspect of South Tongue Point; however, these changes are not considered to be significant. No changes would result from Alternative C.

## PHYSICAL, BIOLOGICAL, CULTURAL, AND SOCIAL ENVIRONMENT - STATE-OWNED ISLANDS

**No significant adverse impacts to the physical, biological, cultural or social environment of the State-owned islands is expected to result from implementation of any of the Alternatives.**

None of the proposed Alternatives would result in a Service change in land use. The protection of wetland habitats as a wintering area and migrational stop-over area would remain the primary focus of the Refuge. None of the alternatives is expected to result in changes to these habitats other than through natural events.

The Service would not expect to significantly change wildlife management practices from those presently existing under cooperative agreements; however, land ownership would allow the Service to develop long-range wildlife habitat management plans with assurance that they could be continued beyond the life of the existing cooperative agreements. Service ownership would provide the Service greater control over habitat management and would allow the Service to protect wildlife from potential threats to habitat.

None of the alternatives would be expected to result in a change from existing public use policies and activities.

### UNAVOIDABLE ADVERSE IMPACTS

Unavoidable impacts are those that would have a significant adverse effect on the environment and for which there are no mitigation measures available to reduce the adverse effect to a level of less than significant. No unavoidable adverse impacts would result from Alternative A. Unavoidable adverse impacts could result from Alternative B to (1) bald eagles, and (2) wetlands. Both of these impacts would be the result of the Phase 2 road connection to North Tongue Point.

### MITIGATION MEASURES

Impacts with the potential to have significant adverse effects require mitigation measures to reduce or eliminate the level of the impact. Alternative A has the potential to generate significant adverse impacts to (1) surface water quality and (2) bald eagles. These impacts could be reduced to a level of less than significant through stormwater management plans; and construction scheduling, project design, and installation of eagle perches.

## **IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES**

Irreversible and irretreivable commitments of resources associated with the proposed project would be the permanent conversion of 0.57 acres of wetlands for Alternative A and approximately 4.57 for Alternative B; the permanent conversion of 50 acres of wildlife habitat; potentially, a reduction in available eagle foraging habitat if the eagles fail to habituate to the disturbance posed by the project; and the energy and resources that would be expended to construct and operate the project.

## **SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY**

The proposed development plan for South Tongue Point has been designed to minimize impacts to the natural environment. Short-term uses of both Alternatives A and B would be construction activities which may be temporarily disruptive to fish and wildlife in the area; however, these impacts are not considered to be significant.

The multi-tenant marine development of both Alternatives A and B would be a long-term use of the site. Long-term productivity of the upland area at South Tongue Point as wildlife habitat would be reduced at full build-out since the development would be within existing vegetated uplands. The long-term productivity of aquatic habitats may be slightly reduced if maintenance dredging is required. Any maintenance dredging to accommodate Navy ships would be modest, particularly when compared to the dredging requirements of alternative project locations, and would occur at relatively long intervals.

Under Alternative B, the long-term productivity of the area to be filled for the new road connection between South Tongue Point and North Tongue Point would be more seriously compromised, but not eliminated.

## **CUMULATIVE IMPACTS**

**No significant cumulative adverse environmental impacts are expected other than to bald eagles. Additional water-dependent development in the project vicinity may lead to the permanent loss of an important foraging area.**

Project development could increase demand for new residential development. The City of Astoria has lost population from its peak, and a large, underutilized infrastructure exists within the City boundaries. A portion of the required housing could, therefore, be accomplished through redevelopment.

South Tongue Point has the potential for providing upland storage area for North Tongue Point, which may allow North Tongue Point to develop more intensively, contributing to a cumulative

decline in water quality through an incremental contribution to pollution, adding to regional impacts which could be carried through all levels of the ecosystem.

A more intensively developed North Tongue Point could also result in an increase in human disturbances over the present levels, which could contribute to a reduction of the foraging efficiency of the Mill Creek bald eagle pair and of wintering eagles presently using the embayment.

### **COMPARISON OF ALTERNATIVES**

Table S-1 presents a comparative matrix of benefits and impacts for each of the three alternatives. The matrix summarizes information presented in Chapter 4.0 for the relevant physical, biological, cultural, social, and economic factors. Alternatives A and B would both have some beneficial and adverse effects. Alternative A, the Service's Preferred Alternative, has the fewest adverse effects. Alternative C would have a neutral effect on existing conditions.



TABLE S-1

## SUMMARY OF ADVERSE AND BENEFICIAL IMPACTS

| Factor                                              | Alternative A | Alternative B | Alternative C |
|-----------------------------------------------------|---------------|---------------|---------------|
| <b>SOUTH TONGUE POINT</b>                           |               |               |               |
| <b>Physical Environment</b>                         |               |               |               |
| Upland Topography                                   | -             | -             | O             |
| Aquatic Topography                                  | -             | -             | O             |
| Soils and Geology                                   | -             | -             | O             |
| Sediments                                           | -             | -             | O             |
| Water Quality                                       | -             | -             | O             |
| Groundwater                                         | O             | O             | O             |
| Water Courses and Floodplains                       | O             | -             | O             |
| Wetlands                                            | -             | --            | O             |
| Air Quality                                         | O             | O             | O             |
| Noise and Activity                                  | -             | -             | O             |
| Transportation                                      | +             | +             | O             |
| Storm Drainage                                      | O             | O             | O             |
| Sanitary Sewer                                      | +             | +             | O             |
| Domestic Water Supply                               | O             | O             | O             |
| Upland Hazardous Materials                          | O             | +             | O             |
| Sediment Hazardous Materials                        | O             | O             | O             |
| <b>Biological Environment</b>                       |               |               |               |
| Plant Communities                                   | -             | -             | O             |
| Threatened, Endangered, and Sensitive Plant Species | O             | O             | O             |
| Fish and Wildlife                                   | -             | -             | O             |
| Salmonids                                           | -             | -             | O             |
| Bald Eagles                                         | -             | --            | O             |
| <b>Cultural and Social Environment</b>              |               |               |               |
| Land Use                                            | +             | +             | O             |
| Population                                          | +             | +             | O             |
| Housing                                             | +             | +             | O             |
| Employment                                          | ++            | ++            | O             |
| Fiscal                                              | ++            | ++            | O             |
| Cultural and Archaeological                         | O             | -             | O             |
| Visual Resources                                    | -             | -             | O             |

**KEY:**

- O Neutral effect, with no adverse or significant impacts.
- Some adverse impact, but either not significant or can be mitigated to a level of less than significant.
- Significant adverse impact that cannot be mitigated to a level of less than significant.
- +
- ++ Significant beneficial impact.

TABLE S-1, cont'd.

## SUMMARY OF ADVERSE AND BENEFICIAL IMPACTS

| Factor                                        | Alternative A | Alternative B | Alternative C |
|-----------------------------------------------|---------------|---------------|---------------|
| <b>STATE-OWNED ISLANDS</b>                    |               |               |               |
| <b>Physical Environment</b>                   |               |               |               |
| Submerged Lands and Wetlands                  | O             | O             | O             |
| Uplands                                       | O             | O             | O             |
| <b>Biological Environment</b>                 |               |               |               |
| Spoil Island Grasslands                       | +             | +             | O             |
| Tidal Marshes, Tidal Swamps, and Forest       | +             | +             | O             |
| Fish and Wildlife                             | +             | +             | O             |
| Threatened, Endangered, and Sensitive Species | +             | +             | O             |
| <b>Social and Cultural Environment</b>        |               |               |               |
| Land Use                                      | O             | O             | O             |
| Public Use                                    | O             | O             | O             |

**KEY:**

- O Neutral effect, with no adverse or significant impacts.
- Some adverse impact, but either not significant or can be mitigated to a level of less than significant.
- Significant adverse impact that cannot be mitigated to a level of less than significant.
- + Some beneficial impact.
- ++ Significant beneficial impact.

## TABLE OF CONTENTS

|                                                                              | <u>Page</u> |
|------------------------------------------------------------------------------|-------------|
| COVER PAGE                                                                   |             |
| ABSTRACT                                                                     |             |
| SUMMARY .....                                                                | S-1         |
| TABLE OF CONTENTS .....                                                      | i           |
| LIST OF FIGURES .....                                                        | x           |
| LIST OF TABLES .....                                                         | xi          |
| <br><u>CHAPTER 1</u>                                                         |             |
| 1.0 PURPOSE OF AND NEED FOR ACTION .....                                     | 1-1         |
| 1.1 PURPOSE AND NEED .....                                                   | 1-1         |
| 1.1.1 DIVISION OF STATE LANDS .....                                          | 1-1         |
| 1.1.2 U.S. FISH AND WILDLIFE SERVICE .....                                   | 1-2         |
| 1.1.3 U.S. ARMY CORPS OF ENGINEERS .....                                     | 1-2         |
| 1.1.4 U.S. GENERAL SERVICES ADMINISTRATION .....                             | 1-3         |
| 1.1.5 SHARED AGENCY NEEDS AND RESPONSIBILITIES .....                         | 1-3         |
| 1.2 SCOPING .....                                                            | 1-3         |
| 1.2.1 EFFECTS ON OTHER THREATENED, ENDANGERED, OR<br>SENSITIVE SPECIES ..... | 1-4         |
| 1.2.2 EFFECTS OF DREDGING .....                                              | 1-4         |
| 1.2.3 EFFECTS ON MEDIATION PANEL AGREEMENT .....                             | 1-5         |
| 1.2.4 EFFECTS FROM NUCLEAR CAPABILITIES OF NAVY SHIPS ..                     | 1-5         |
| 1.3 THE DECISION-MAKING PROCESS .....                                        | 1-5         |
| 1.4 ORGANIZATION OF THE EIS .....                                            | 1-6         |
| <br><u>CHAPTER 2</u>                                                         |             |
| 2.0 ALTERNATIVES .....                                                       | 2-1         |
| 2.1 SUMMARY OF ELIMINATED AND ADVANCED ALTERNATIVES ....                     | 2-1         |
| 2.1.1 SUMMARY OF ALTERNATIVES ELIMINATED FROM<br>FURTHER STUDY .....         | 2-1         |
| 2.1.2 SUMMARY OF ALTERNATIVES ADVANCED FOR FURTHER<br>STUDY .....            | 2-2         |

## TABLE OF CONTENTS, cont'd.

|                                                                                            | <u>Page</u> |
|--------------------------------------------------------------------------------------------|-------------|
| 2.2 DESCRIPTION OF ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY . . . . .    | 2-2         |
| 2.2.1 LAND EXCHANGE ALTERNATIVES . . . . .                                                 | 2-2         |
| 2.2.1.1 Exchange of Other State-Owned Lands . . . . .                                      | 2-2         |
| 2.2.1.2 Screening South Tongue Point for Further Federal Use . . . . .                     | 2-2         |
| 2.2.1.3 Sale of South Tongue Point . . . . .                                               | 2-2         |
| 2.2.1.4 Delaying the Disposal of South Tongue Point . . . . .                              | 2-3         |
| 2.2.2 ALTERNATIVE LOCATIONS FOR A MARINE INDUSTRIAL PARK . . . . .                         | 2-3         |
| 2.2.2.1 Parameters . . . . .                                                               | 2-3         |
| A. Urban Location . . . . .                                                                | 2-3         |
| B. Development Parcels . . . . .                                                           | 2-3         |
| C. Water-Dependent and Non-Water-Dependent Areas . . . . .                                 | 2-4         |
| D. Water Access . . . . .                                                                  | 2-4         |
| E. Road Access . . . . .                                                                   | 2-4         |
| F. Rail Access . . . . .                                                                   | 2-4         |
| G. Environmentally Sensitive Areas . . . . .                                               | 2-5         |
| H. Conflict with Existing or Proposed Use . . . . .                                        | 2-5         |
| 2.2.2.2 Sites Considered . . . . .                                                         | 2-5         |
| A. North Tongue Point . . . . .                                                            | 2-5         |
| B. East Astoria . . . . .                                                                  | 2-7         |
| C. Astoria Plywood . . . . .                                                               | 2-7         |
| D. Port of Astoria Docks . . . . .                                                         | 2-8         |
| E. South Astoria . . . . .                                                                 | 2-8         |
| F. East Skipanon . . . . .                                                                 | 2-9         |
| G. West Skipanon . . . . .                                                                 | 2-9         |
| H. Warrenton Boat Basin . . . . .                                                          | 2-9         |
| I. Tansy Point . . . . .                                                                   | 2-10        |
| J. East Hammond . . . . .                                                                  | 2-10        |
| K. Hammond Boat Basin . . . . .                                                            | 2-10        |
| L. Conclusion . . . . .                                                                    | 2-11        |
| 2.2.3 DEVELOPMENT ALTERNATIVES . . . . .                                                   | 2-11        |
| 2.2.3.1 Multi-Tenant Development Concepts at South Tongue Point . . . . .                  | 2-11        |
| A. Development Concepts . . . . .                                                          | 2-11        |
| B. Smaller Multi-Tenant Marine Industrial Development at South Tongue Point . . . . .      | 2-15        |
| C. Navy at North Tongue Point and Multi-Tenant Development at South Tongue Point . . . . . | 2-16        |



## TABLE OF CONTENTS, cont'd.

|                                                                                                                              | <u>Page</u> |
|------------------------------------------------------------------------------------------------------------------------------|-------------|
| 2.2.3.2 Single-Tenant Development Concepts . . . . .                                                                         | 2-17        |
| A. Large-Scale Industrial Use at South Tongue Point . . .                                                                    | 2-17        |
| B. Navy as Single-Tenant Development at South Tongue<br>Point . . . . .                                                      | 2-17        |
| C. Navy as Single-Tenant Development at North Tongue<br>Point with no Private Development at South Tongue<br>Point . . . . . | 2-18        |
| 2.2.3.3 Non-Water-Related Industrial Development Concept at South<br>Tongue Point . . . . .                                  | 2-19        |
| 2.2.3.4 Maximum Build-Out at South Tongue Point . . . . .                                                                    | 2-20        |
| 2.3 DESCRIPTION OF ALTERNATIVES CONSIDERED FOR DETAILED<br>STUDY . . . . .                                                   | 2-20        |
| 2.3.1 ALTERNATIVE A - DEVELOPMENT OF SOUTH TONGUE<br>POINT . . . . .                                                         | 2-20        |
| 2.3.1.1 Land Exchange . . . . .                                                                                              | 2-20        |
| A. Screening for Public Use . . . . .                                                                                        | 2-20        |
| B. Selection of Islands . . . . .                                                                                            | 2-21        |
| 2.3.1.2 Multi-Tenant Marine Industrial Development . . . . .                                                                 | 2-21        |
| A. Phase 1 . . . . .                                                                                                         | 2-22        |
| B. Phase 2 . . . . .                                                                                                         | 2-25        |
| 2.3.2 ALTERNATIVE B - DEVELOPMENT OF SOUTH TONGUE<br>POINT WITH A ROAD CONNECTION TO NORTH TONGUE<br>POINT . . . . .         | 2-26        |
| A. Phase 2 . . . . .                                                                                                         | 2-26        |
| 2.3.3 ALTERNATIVE C - THE NO ACTION ALTERNATIVE . . . . .                                                                    | 2-27        |

### CHAPTER 3

|                                                                   |     |
|-------------------------------------------------------------------|-----|
| 3.0 AFFECTED ENVIRONMENT . . . . .                                | 3-1 |
| 3.1 SOUTH TONGUE POINT . . . . .                                  | 3-1 |
| 3.1.1 PHYSICAL ENVIRONMENT . . . . .                              | 3-1 |
| 3.1.1.1 Project Location and Vicinity Description . . . . .       | 3-1 |
| 3.1.1.2 Climate and Weather . . . . .                             | 3-2 |
| 3.1.1.3 Topography and Site Description . . . . .                 | 3-2 |
| A. Upland Topography and Site Description . . . . .               | 3-2 |
| B. Aquatic Topography and Site Description . . . . .              | 3-3 |
| 3.1.1.4 Soils, Geology, Sediments, and Geologic Hazards . . . . . | 3-4 |
| A. Soils . . . . .                                                | 3-4 |
| B. Geology . . . . .                                              | 3-4 |
| C. Sediments . . . . .                                            | 3-5 |
| D. Geologic Hazards . . . . .                                     | 3-5 |

## TABLE OF CONTENTS, cont'd.

|                                                            | <u>Page</u> |
|------------------------------------------------------------|-------------|
| 3.1.1.5 Hydraulics and Hydrology . . . . .                 | 3-7         |
| A. Hydrology . . . . .                                     | 3-7         |
| B. Surface Water Quality . . . . .                         | 3-8         |
| C. Groundwater . . . . .                                   | 3-13        |
| D. Drainage . . . . .                                      | 3-14        |
| E. Water Courses and Flood Plains . . . . .                | 3-14        |
| F. Wetlands . . . . .                                      | 3-14        |
| 3.1.1.6 Air Quality . . . . .                              | 3-15        |
| 3.1.1.7 Noise and Activity . . . . .                       | 3-15        |
| A. Noise . . . . .                                         | 3-15        |
| B. Activity . . . . .                                      | 3-17        |
| 3.1.1.8 Public Facilities . . . . .                        | 3-18        |
| A. Transportation . . . . .                                | 3-18        |
| B. Storm Drainage . . . . .                                | 3-19        |
| C. Sanitary Sewer . . . . .                                | 3-19        |
| D. Domestic Water Supply . . . . .                         | 3-19        |
| E. Utilities . . . . .                                     | 3-20        |
| 3.1.1.9 Hazardous Materials . . . . .                      | 3-20        |
| A. Upland Hazardous Materials . . . . .                    | 3-20        |
| B. Sediment Hazardous Materials . . . . .                  | 3-21        |
| 3.1.2 BIOLOGICAL ENVIRONMENT . . . . .                     | 3-22        |
| 3.1.2.1 Vegetation . . . . .                               | 3-22        |
| A. Plant Communities . . . . .                             | 3-23        |
| B. Threatened, Endangered, and Sensitive Plant Species . . | 3-25        |
| 3.1.2.2 Fish and Wildlife . . . . .                        | 3-27        |
| A. Fish and Wildlife Species Observed and Expected . . . . | 3-27        |
| B. Threatened, Endangered, and Sensitive Wildlife Species  | 3-40        |
| 3.1.3 CULTURAL AND SOCIAL ENVIRONMENT . . . . .            | 3-47        |
| 3.1.3.1 Land Use . . . . .                                 | 3-47        |
| A. Local Setting . . . . .                                 | 3-47        |
| B. Comprehensive Plan and Zoning Designations . . . . .    | 3-47        |
| C. Existing Uses . . . . .                                 | 3-49        |
| 3.1.3.2 Socioeconomic . . . . .                            | 3-49        |
| A. Population . . . . .                                    | 3-49        |
| B. Employment . . . . .                                    | 3-50        |
| C. Housing . . . . .                                       | 3-54        |
| D. Fiscal . . . . .                                        | 3-54        |

## TABLE OF CONTENTS, cont'd.

|                                                              | <u>Page</u> |
|--------------------------------------------------------------|-------------|
| 3.1.3.3 Cultural . . . . .                                   | 3-55        |
| A. Development of Site . . . . .                             | 3-55        |
| B. Historic . . . . .                                        | 3-55        |
| C. Archaeological . . . . .                                  | 3-56        |
| 3.1.3.4 Visual Resources . . . . .                           | 3-57        |
| A. Views of the Site . . . . .                               | 3-57        |
| B. Views from the Site . . . . .                             | 3-57        |
| 3.2 STATE-OWNED ISLANDS . . . . .                            | 3-57        |
| 3.2.1 PHYSICAL ENVIRONMENT . . . . .                         | 3-57        |
| 3.2.1.1 Project Location . . . . .                           | 3-57        |
| 3.2.1.2 Topography and Site Description . . . . .            | 3-58        |
| A. Submerged Lands . . . . .                                 | 3-58        |
| B. Wetlands . . . . .                                        | 3-58        |
| C. Uplands . . . . .                                         | 3-58        |
| 3.2.1.3 Climate and Weather . . . . .                        | 3-59        |
| 3.2.1.4 Soils and Sediments . . . . .                        | 3-59        |
| 3.2.1.5 Hazardous Materials . . . . .                        | 3-59        |
| 3.2.2 BIOLOGICAL ENVIRONMENT . . . . .                       | 3-59        |
| 3.2.2.1 Wildlife Habitats . . . . .                          | 3-59        |
| A. Spoil Island Grasslands . . . . .                         | 3-59        |
| B. Tidal Marshes . . . . .                                   | 3-60        |
| C. Tidal Swamps . . . . .                                    | 3-60        |
| D. Upland Forest . . . . .                                   | 3-60        |
| 3.2.2.2 Fish and Wildlife . . . . .                          | 3-60        |
| A. Fish and Wildlife Species Observed and Expected . . . . . | 3-60        |
| B. Threatened and Endangered Species . . . . .               | 3-61        |
| 3.2.3 CULTURAL AND SOCIAL ENVIRONMENT . . . . .              | 3-62        |
| 3.2.3.1 Land Use . . . . .                                   | 3-62        |
| 3.2.3.2 Public Use . . . . .                                 | 3-62        |
| A. Hunting . . . . .                                         | 3-62        |
| B. Fishing . . . . .                                         | 3-63        |
| C. Wildlife Observation . . . . .                            | 3-63        |
| D. Camping and Picnicking . . . . .                          | 3-63        |
| E. Houseboats . . . . .                                      | 3-63        |

## TABLE OF CONTENTS, cont'd.

|                                                                                           | <u>Page</u> |
|-------------------------------------------------------------------------------------------|-------------|
| <b>CHAPTER 4</b>                                                                          |             |
| 4.0 ENVIRONMENTAL CONSEQUENCES . . . . .                                                  | 4-1         |
| 4.1 SOUTH TONGUE POINT . . . . .                                                          | 4-1         |
| 4.1.1 PHYSICAL ENVIRONMENT . . . . .                                                      | 4-1         |
| 4.1.1.1 Topography . . . . .                                                              | 4-1         |
| A. Upland Topography . . . . .                                                            | 4-1         |
| B. Aquatic Topography . . . . .                                                           | 4-2         |
| 4.1.1.2 Soils, Geology, and Sediments . . . . .                                           | 4-3         |
| A. Soils and Geology . . . . .                                                            | 4-3         |
| B. Sediments . . . . .                                                                    | 4-4         |
| 4.1.1.3 Hydraulics and Hydrology . . . . .                                                | 4-5         |
| A. Surface Water Quality . . . . .                                                        | 4-5         |
| B. Groundwater . . . . .                                                                  | 4-6         |
| C. Water Courses and Flood Plains . . . . .                                               | 4-7         |
| D. Wetlands . . . . .                                                                     | 4-8         |
| 4.1.1.4 Air Quality . . . . .                                                             | 4-10        |
| 4.1.1.5 Noise and Activity . . . . .                                                      | 4-11        |
| 4.1.1.6 Public Facilities . . . . .                                                       | 4-15        |
| A. Transportation . . . . .                                                               | 4-15        |
| B. Storm Drainage . . . . .                                                               | 4-16        |
| C. Sanitary Sewer . . . . .                                                               | 4-17        |
| D. Domestic Water Supply . . . . .                                                        | 4-17        |
| 4.1.1.7 Utilities . . . . .                                                               | 4-18        |
| 4.1.1.8 Hazardous Materials . . . . .                                                     | 4-18        |
| A. Upland Hazardous Materials . . . . .                                                   | 4-18        |
| B. Sediment Hazardous Materials . . . . .                                                 | 4-20        |
| 4.1.2 BIOLOGICAL ENVIRONMENT . . . . .                                                    | 4-21        |
| 4.1.2.1 Vegetation . . . . .                                                              | 4-21        |
| A. Plant Communities and Threatened, Endangered, and<br>Sensitive Plant Species . . . . . | 4-21        |
| 4.1.2.2 Fish and Wildlife . . . . .                                                       | 4-24        |
| A. Fish and Wildlife Observed and Expected . . . . .                                      | 4-24        |
| B. Threatened, Endangered, and Sensitive Wildlife Species . . . . .                       | 4-28        |



## TABLE OF CONTENTS, cont'd.

|                                                                                            | <u>Page</u> |
|--------------------------------------------------------------------------------------------|-------------|
| 4.1.3 CULTURAL AND SOCIAL ENVIRONMENT .....                                                | 4-39        |
| 4.1.3.1 Land Use .....                                                                     | 4-39        |
| 4.1.3.2 Socioeconomic .....                                                                | 4-39        |
| A. Population .....                                                                        | 4-41        |
| B. Housing .....                                                                           | 4-42        |
| C. Employment .....                                                                        | 4-43        |
| D. Fiscal .....                                                                            | 4-44        |
| 4.1.3.3 Cultural and Archeological .....                                                   | 4-45        |
| 4.1.3.4 Visual Resources .....                                                             | 4-45        |
| A. Views of and from the Site .....                                                        | 4-45        |
| 4.2 STATE-OWNED ISLANDS .....                                                              | 4-46        |
| 4.2.1 PHYSICAL ENVIRONMENT .....                                                           | 4-46        |
| 4.2.1.1 Topography, Soils and Sediments .....                                              | 4-46        |
| A. Submerged Lands and Wetlands .....                                                      | 4-46        |
| B. Uplands .....                                                                           | 4-46        |
| 4.2.1.2 Other Physical Features .....                                                      | 4-47        |
| 4.2.2 BIOLOGICAL ENVIRONMENT .....                                                         | 4-47        |
| 4.2.2.1 Wildlife Habitats .....                                                            | 4-47        |
| A. Spoil Island Grasslands .....                                                           | 4-47        |
| B. Tidal Marshes, Tidal Swamps, and Upland Forest .....                                    | 4-48        |
| 4.2.2.2 Fish and Wildlife .....                                                            | 4-48        |
| A. Fish and Wildlife Observed and Expected .....                                           | 4-48        |
| B. Threatened, Endangered, and Sensitive Species .....                                     | 4-48        |
| 4.2.3 SOCIAL AND CULTURAL ENVIRONMENT .....                                                | 4-48        |
| 4.2.3.1 Land Use .....                                                                     | 4-48        |
| 4.2.3.2 Public Use .....                                                                   | 4-48        |
| 4.3 COMPARISON OF ALTERNATIVES .....                                                       | 4-49        |
| 4.4 UNAVOIDABLE ADVERSE IMPACTS .....                                                      | 4-49        |
| 4.5 MITIGATION MEASURES .....                                                              | 4-49        |
| 4.5.1 MITIGATION MEASURES FOR IMPACTS TO SURFACE<br>WATER QUALITY .....                    | 4-52        |
| 4.5.2 MITIGATION MEASURES FOR IMPACTS TO BALD EAGLES .....                                 | 4-53        |
| 4.5.2.1 Compensation for Temporary Disturbances Caused By<br>Construction Activities ..... | 4-53        |
| 4.5.2.2 Compensation for the Impacts of Project Design .....                               | 4-54        |
| 4.5.2.3 Compensation for the Disturbances Caused by Project<br>Operation .....             | 4-54        |

## TABLE OF CONTENTS, cont'd.

|                                                                                                                                                                            | <u>Page</u> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 4.6 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF<br>RESOURCES .....                                                                                                       | 4-54        |
| 4.7 SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY .....                                                                                                                    | 4-55        |
| 4.8 CUMULATIVE IMPACTS .....                                                                                                                                               | 4-55        |
| 4.8.1 CUMULATIVE IMPACTS ON HOUSING AND<br>INFRASTRUCTURE .....                                                                                                            | 4-55        |
| 4.8.2 CUMULATIVE IMPACTS ON THE BIOLOGICAL<br>ENVIRONMENT .....                                                                                                            | 4-56        |
| <br><u>CHAPTER 5</u>                                                                                                                                                       |             |
| 5.0 COMPLIANCE, CONSULTATION, AND COORDINATION .....                                                                                                                       | 5-1         |
| 5.1 ENVIRONMENTAL REVIEW AND CONSULTATION .....                                                                                                                            | 5-1         |
| 5.1.1 FEDERAL LEGISLATIVE ACTS .....                                                                                                                                       | 5-1         |
| 5.1.1.1 The Endangered Species Act of 1973 (16 U.S.C. 1531 et<br>seq.) .....                                                                                               | 5-1         |
| 5.1.1.2 Comprehensive Environmental Responses, Compensation,<br>and Liability Act (42 U.S.C. 9620) .....                                                                   | 5-1         |
| 5.1.1.3 Uniform Relocation Assistance and Real Property<br>Acquisition Policy Act of 1970 (42 U.S.C. 4601, 4602,<br>4621-4638, 4651-4655, P.L.91-646, 84 Stat. 1894) ..... | 5-1         |
| 5.1.1.4 Coastal Zone Management Act of 1972 (16 U.S.C. Sec 1451<br>et seq.) .....                                                                                          | 5-1         |
| 5.1.1.5 National Wildlife Refuge System Administration Act of<br>1966, as amended (16 U.S.C. 6688dd-668ee) .....                                                           | 5-2         |
| 5.1.2 EXECUTIVE ORDERS .....                                                                                                                                               | 5-2         |
| 5.1.2.1 Protection of Wetlands -- Executive Order 11990 .....                                                                                                              | 5-2         |
| 5.1.2.2 Flood Plain Management -- Executive Order 11988 .....                                                                                                              | 5-2         |
| 5.1.2.3 Protection of Historical, Archaeological, and Scientific<br>Properties -- Executive Order 11593 .....                                                              | 5-2         |
| 5.1.3 COORDINATION WITH FEDERAL, STATE, AND LOCAL<br>AGENCIES .....                                                                                                        | 5-2         |
| 5.1.3.1 Coordination with Federal Agencies .....                                                                                                                           | 5-2         |
| 5.1.3.2 Coordination with State and Local Agencies .....                                                                                                                   | 5-3         |

## TABLE OF CONTENTS, cont'd.

|                                                                                            | <u>Page</u> |
|--------------------------------------------------------------------------------------------|-------------|
| 5.1.4 CONFORMANCE WITH LOCAL COMPREHENSIVE PLANS<br>AND STATEWIDE PLANNING GOALS . . . . . | 5-3         |
| 5.1.4.1 Statewide Planning Goals . . . . .                                                 | 5-3         |
| A. Goal 1: Citizen Involvement . . . . .                                                   | 5-3         |
| B. Goal 2: Land Use Planning . . . . .                                                     | 5-4         |
| C. Goal 3: Agricultural Land . . . . .                                                     | 5-4         |
| D. Goal 4: Forest Land . . . . .                                                           | 5-4         |
| E. Goal 5: Open Spaces, Scenic and Historic Areas, and<br>Natural Resources . . . . .      | 5-4         |
| F. Goal 6: Air, Water and Land Resources Quality . . . . .                                 | 5-4         |
| G. Goal 7: Areas Subject to Natural Disasters and Hazards . . . . .                        | 5-5         |
| H. Goal 8: Recreational Needs . . . . .                                                    | 5-5         |
| I. Goal 9: Economic Development . . . . .                                                  | 5-5         |
| J. Goal 10: Housing . . . . .                                                              | 5-5         |
| K. Goal 11: Public Facilities and Services . . . . .                                       | 5-5         |
| L. Goal 12: Transportation . . . . .                                                       | 5-6         |
| M. Goal 13: Energy Conservation . . . . .                                                  | 5-6         |
| N. Goal 14: Urbanization . . . . .                                                         | 5-6         |
| O. Goal 15: Willamette River Greenway . . . . .                                            | 5-6         |
| P. Goal 16: Estuarine Resources . . . . .                                                  | 5-7         |
| Q. Goal 17: Coastal Shorelands . . . . .                                                   | 5-7         |
| R. Goal 18: Beaches and Dunes; Goal 19: Ocean<br>Resources . . . . .                       | 5-7         |
| S. Conclusion . . . . .                                                                    | 5-7         |
| 5.2 PUBLIC INVOLVEMENT . . . . .                                                           | 5-7         |
| 5.3 DRAFT EIS DISTRIBUTION . . . . .                                                       | 5-8         |
| 5.3.1 FEDERAL AND STATE CONGRESSIONAL DELEGATIONS . . . . .                                | 5-8         |
| 5.3.2 FEDERAL AGENCIES . . . . .                                                           | 5-8         |
| 5.3.3 STATE AND LOCAL AGENCIES . . . . .                                                   | 5-8         |
| 5.3.4 PUBLIC LIBRARIES . . . . .                                                           | 5-9         |
| 5.3.5 PRIVATE INDIVIDUALS AND GROUPS . . . . .                                             | 5-9         |

## TABLE OF CONTENTS, cont'd.

|                                                    | <u>Page</u> |
|----------------------------------------------------|-------------|
| <u>CHAPTER 6</u>                                   |             |
| 6.0 LIST OF PREPARERS . . . . .                    | 6-1         |
| 6.1 U.S. FISH AND WILDLIFE SERVICE . . . . .       | 6-1         |
| 6.2 U.S. ARMY CORPS OF ENGINEERS . . . . .         | 6-1         |
| 6.3 U.S. GENERAL SERVICES ADMINISTRATION . . . . . | 6-1         |
| 6.4 OREGON DIVISION OF STATE LANDS . . . . .       | 6-2         |
| 6.5 DAVID EVANS AND ASSOCIATES, INC. . . . .       | 6-2         |
| 6.6 CLEARWATER BIOSTUDIES, INC. . . . .            | 6-3         |
| 6.7 HAMILTON, RABINOVITZ & ALSCHULER, INC. . . . . | 6-3         |
| 6.8 OGDEN BEEMAN & ASSOCIATES, INC. . . . .        | 6-3         |
| 6.9 R & W ENGINEERING, INC . . . . .               | 6-3         |
| 6.10 TETRA TECH . . . . .                          | 6-3         |
| <u>CHAPTER 7</u>                                   |             |
| 7.0 REFERENCES CITED . . . . .                     | 7-1         |
| <u>CHAPTER 8</u>                                   |             |
| 8.0 GLOSSARY . . . . .                             | 8-1         |
| <u>CHAPTER 9</u>                                   |             |
| 9.0 INDEX . . . . .                                | 9-1         |
| <u>APPENDICES</u>                                  |             |
| A. Scoping Report . . . . .                        | A-1         |
| B. Species Lists . . . . .                         | B-1         |
| C. Wetland Mitigation Plan . . . . .               | C-1         |



## LIST OF FIGURES

| <u>Number</u> |                                                                                                                                                                                                                                                                                    | <u>Follows Page</u> |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| S-1           | South Tongue Point Project Area . . . . .                                                                                                                                                                                                                                          | S-1                 |
| 1-1           | Vicinity Map . . . . .                                                                                                                                                                                                                                                             | 1-1                 |
| 2-1           | Alternative Sites for Marine Industrial Park . . . . .                                                                                                                                                                                                                             | 2-6                 |
| 2-2           | Development Concepts . . . . .                                                                                                                                                                                                                                                     | 2-11                |
| 2-3           | State-Owned Islands Proposed for Exchange . . . . .                                                                                                                                                                                                                                | 2-21                |
| 2-4           | Alternative A . . . . .                                                                                                                                                                                                                                                            | 2-22                |
| 2-5           | Wetland Impacts . . . . .                                                                                                                                                                                                                                                          | 2-22                |
| 2-6           | Alternative B . . . . .                                                                                                                                                                                                                                                            | 2-26                |
| 3-1           | Site and Surrounding Area . . . . .                                                                                                                                                                                                                                                | 3-1                 |
| 3-2           | Existing Conditions . . . . .                                                                                                                                                                                                                                                      | 3-3                 |
| 3-3           | Natural Features Map . . . . .                                                                                                                                                                                                                                                     | 3-4                 |
| 3-4           | Vegetation Map . . . . .                                                                                                                                                                                                                                                           | 3-15                |
| 3-5           | Noise Measurement Locations . . . . .                                                                                                                                                                                                                                              | 3-16                |
| 3-6           | Biological Sampling Stations for Benthic Invertebrates and Fish . . . . .                                                                                                                                                                                                          | 3-28                |
| 3-7           | Mean annual number (top) and weight (bottom) of invertebrates sampled from various sites in the Columbia River Estuary. All locations other than "Cathlamet Bay" (*) were sampled by Durkin and Emmett (1980), while "Cathlamet Bay" was sampled by Emmett et al. (1986) . . . . . | 3-28                |
| 3-8           | Composition by number (top) and weight (bottom) of benthic invertebrates sampled from four stations near South Tongue Point, Oregon (Durkin and Emmett, 1980) . . . . .                                                                                                            | 3-29                |
| 3-9           | Aquatic Habitats . . . . .                                                                                                                                                                                                                                                         | 3-30                |
| 3-10          | Seasonal abundance for salmonid and non-salmonid fishes captured by National Marine Fisheries Service using beach seines (in intertidal/shallow subtidal habitat) and a bottom trawl (in deep subtidal habitat) near South Tongue Point, Oregon. (McCabe 1991a,b) . . . . .        | 3-30                |
| 3-11          | Seasonal abundance (catch per beach seine [net] set) of all juvenile salmonids (top) and of three species of salmon (bottom) in intertidal/shallow subtidal habitat near South Tongue Point, Oregon. (McCabe, 1991b and Cates, 1983). . . . .                                      | 3-31                |
| 3-12          | Areas of Bald Eagle Use Adjacent to South Tongue Point . . . . .                                                                                                                                                                                                                   | 3-42                |
| 3-13          | Comprehensive Plan and Zoning Designations . . . . .                                                                                                                                                                                                                               | 3-48                |
| 3-14          | Administrative Boundary of Lewis and Clark National Wildlife Refuge . . . . .                                                                                                                                                                                                      | 3-57                |
| 4-1           | Population Impacts . . . . .                                                                                                                                                                                                                                                       | 4-41                |
| 4-2           | Housing Impacts . . . . .                                                                                                                                                                                                                                                          | 4-42                |
| 4-3           | Direct, Indirect, Induced Employment Impacts . . . . .                                                                                                                                                                                                                             | 4-43                |
| 4-4           | Direct, Indirect, Induced Income Impacts . . . . .                                                                                                                                                                                                                                 | 4-44                |
| 4-5           | Property Tax Revenue Impacts at Lease Out . . . . .                                                                                                                                                                                                                                | 4-44                |

### APPENDIX C

|   |                                                      |     |
|---|------------------------------------------------------|-----|
| 1 | Wetland Mitigation Plan and Cross Sections . . . . . | C-2 |
|---|------------------------------------------------------|-----|

## LIST OF TABLES

| <u>Number</u>                                                                                                                                                                                | <u>Page</u> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| S-1 Summary of Adverse and Beneficial Impacts . . . . .                                                                                                                                      | S-12        |
| 2-1 Alternative Sites for Marine Industrial Park . . . . .                                                                                                                                   | 2-6         |
| 2-2 Common Features of Development Concepts A through G . . . . .                                                                                                                            | 2-12        |
| 2-3 Summary Comparison of Alternative Development Concepts . . . . .                                                                                                                         | 2-13        |
| 2-4 Priority List of Potential State-Owned Exchange Land within Lewis and Clark<br>National Wildlife Refuge . . . . .                                                                        | 2-22        |
| 3-1 Dissolved Chemical Concentrations Measured in the Columbia River near Tongue<br>Point and Tansy Point in July 1980, and Compliance with Oregon State Water<br>Quality Criteria . . . . . | 3-10        |
| 3-2 Allowable Noise Levels in One Hour for Industrial Uses Adjacent to Quiet<br>Residential Areas in A-Weighted Decibels (dBA) . . . . .                                                     | 3-16        |
| 3-3 Measured Sound Pressure Levels at South Tongue Point in A-Weighted Decibels<br>(dBA) . . . . .                                                                                           | 3-17        |
| 3-4 Clatsop County Population Distribution . . . . .                                                                                                                                         | 3-51        |
| 3-5 Clatsop County Employment . . . . .                                                                                                                                                      | 3-52        |
| 4-1 Summary of Wetland Impacts . . . . .                                                                                                                                                     | 4-9         |
| 4-2 Calculated Noise Levels . . . . .                                                                                                                                                        | 4-13        |
| 4-3 Summary of Shading Impacts for the Proposed South Tongue Point Project in<br>Square Feet (Alternatives A and B) . . . . .                                                                | 4-23        |
| 4-4 Summary of Adverse and Beneficial Impacts . . . . .                                                                                                                                      | 4-50        |

## APPENDIX B

|                                                                                                                                                                 |      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1 Plant Species Observed at South Tongue Point . . . . .                                                                                                        | B-2  |
| 2 Freshwater and Brackish-Tolerant Zooplankton Taxa which have been found in<br>areas of the Columbia River Estuary Similar to South Tongue Point, Oregon . . . | B-4  |
| 3 List of Benthic Invertebrate Taxa Sampled from Cathlamet Bay, Oregon . . . . .                                                                                | B-5  |
| 4 Seasonal Abundance of Benthic Invertebrates Collected from Four Locations<br>(Stations 42, 43, 44 and 45) in Cathlamet Bay near Tongue Point, 1977-1978 . . . | B-6  |
| 5 Species Composition and Relative Abundance of Fish Captured by Beach Seine<br>and by Bottom Trawl at or near South Tongue Point, Oregon . . . . .             | B-7  |
| 6 Wildlife Species Observed and Expected at South Tongue Point: Reptiles and<br>Amphibians . . . . .                                                            | B-8  |
| 7 Wildlife Species Observed and Expected at South Tongue Point: Birds . . . . .                                                                                 | B-9  |
| 8 Wildlife Species Observed and Expected at South Tongue Point: Mammals . . . .                                                                                 | B-11 |

## CHAPTER 1.0 PURPOSE OF AND NEED FOR ACTION

### 1.1 PURPOSE AND NEED

#### 1.1.1 DIVISION OF STATE LANDS

In spite of a wealth of natural resources associated with Clatsop County, Oregon, this area has been subject to increasingly poor economic conditions in the last decade. Low paying jobs, lack of employment opportunities, lack of affordable housing, lack of reliable transportation, high medical and food costs, and an out-migration of much of the potential workforce have contributed to increased poverty in Clatsop County.

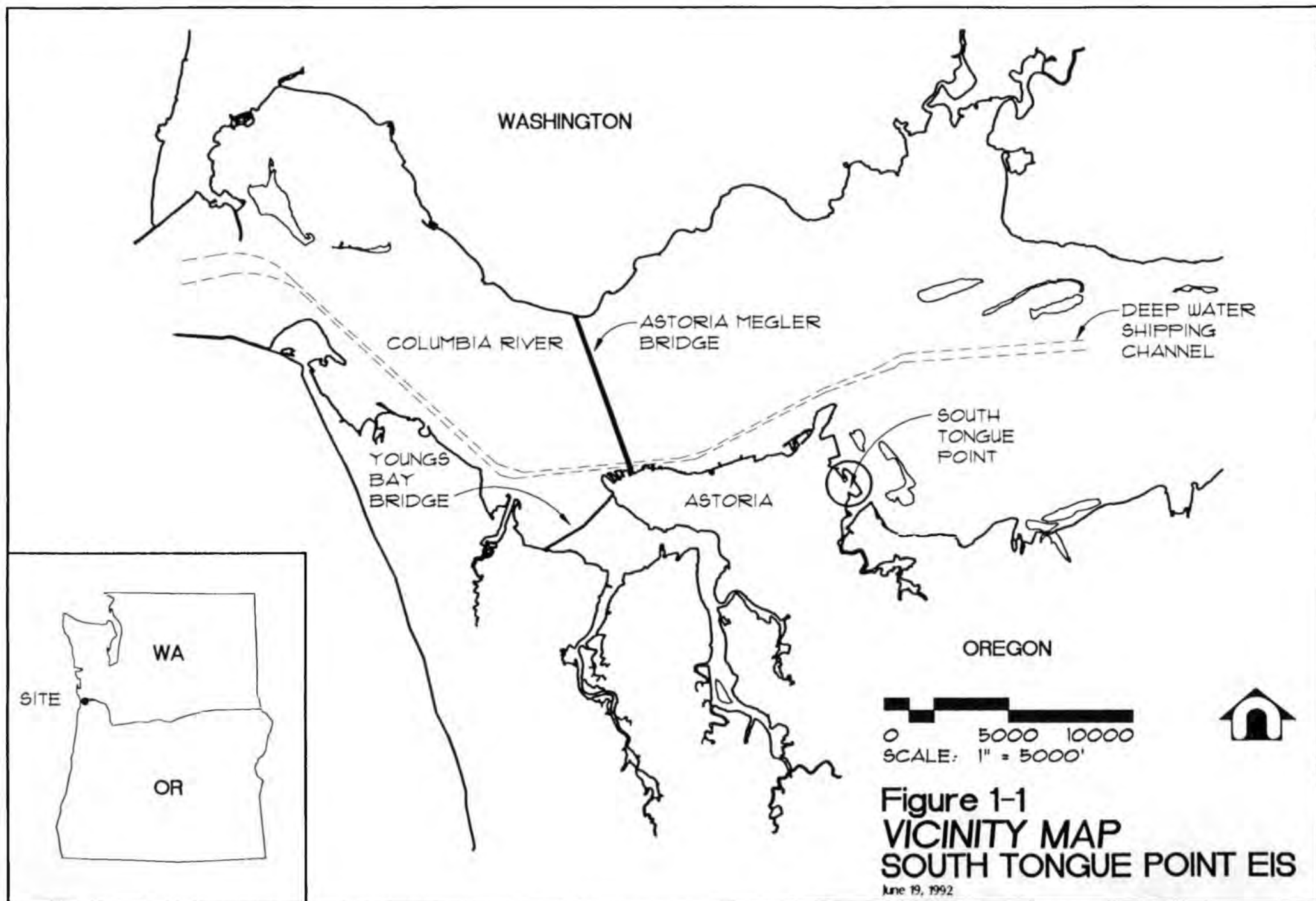
In order to enhance the economic health of Clatsop County and the State of Oregon, the Division of State Lands (Division), an agency of the State of Oregon, has initiated an economic development project within Clatsop County.

In 1979, the U.S. Government declared the property known as South Tongue Point near Astoria, Oregon (Figure 1-1) to be surplus to the Federal inventory. In 1981, the Division contacted the Federal government regarding a possible exchange of property involving South Tongue Point and State-owned islands in the Columbia River.

In May of 1989, the U.S. Navy contacted the Division regarding the possibility of homeporting two minehunter coastal crafts at South Tongue Point. At the time, the Division was studying the feasibility of acquiring South Tongue Point and developing the site as a marine industrial park, in conjunction with the Federal government's proposal to exchange property with the Division. The Navy's interest led to the development of a master plan for the marine industrial park at South Tongue Point, with the Navy as the first proposed tenant.

The U.S. General Services Administration (GSA) is proposing to convey approximately 105 acres of upland and submerged lands administered by the U.S. Army Corps of Engineers (Corps) to the Division. In exchange for the Federal land, the Division is proposing to convey State-owned land of equal value, within the administrative boundary of the Lewis and Clark National Wildlife Refuge (Refuge), to GSA, which will in turn transfer those lands to the U.S. Fish and Wildlife Service (Service). The Division has proposed to develop a multi-tenant marine industrial park on the property conveyed to them.

The Oregon State Land Board, through the Division, has the authority to acquire and lease properties as an investment of the Common School Fund and manage various land assets and monies of the Common School Fund with the objective of obtaining the greatest benefit for the people of the State of Oregon.





The proposed marine industrial park (project) is intended to create real property assets and associated income for the Common School Fund of the State of Oregon, encourage new industrial employment within the South Tongue Point area, and contribute to the economic stability and employment diversification of Clatsop County and the State of Oregon.

The following Federal agencies (Service, Corps, and GSA) are a part of the proposed land exchange and development plan, with responsibilities as described in Sections 1.1.2 through 1.1.4.

### 1.1.2 U.S. FISH AND WILDLIFE SERVICE

The Service has protection responsibilities for migratory birds, threatened and endangered species, and certain anadromous fish and their habitats. Under the proposed land exchange, the Service would gain fee title ownership to certain lands within the administrative boundary of the Refuge.

The Refuge is administered in part under a 50-year cooperative management agreement with State of Oregon. The cooperative agreement was initiated in 1974. Once the cooperative agreement has expired, there is no guarantee another cooperative agreement will be enacted.

Not only is the cooperative agreement between the Service and the Division vulnerable to re-negotiation in 2024, but it currently limits Service control over incompatible and harmful uses. Increasing demand to exploit estuary resources for commercial and recreational use will likely overwhelm the current levels of control within the Refuge. Fee title ownership of the islands would provide a more substantial and durable means of protecting wildlife resources.

In addition, the 1989 Government Accounting Office Report to Congressional Requesters on Continuing Problems with Incompatible Uses on National Wildlife Refuges states:

*For those refuges where FWS [Service] cannot stop harmful secondary uses because of ownership and control limitations, GAO recommends that FWS determine whether the refuges should be improved through the acquisition of needed property rights . . .*

Considering the Service's wildlife protection and management responsibilities and the abundant wildlife resources associated with the Refuge, the Service needs fee title ownership of the lands within the Refuge. Fee title ownership would provide the Service with the necessary control and management flexibility to enhance and protect wildlife populations and their habitats in perpetuity.

### 1.1.3 U.S. ARMY CORPS OF ENGINEERS

The United States, under the authority of Executive Order Survey 11954, dated January 7, 1977 as amended by Executive Order Survey 12512, dated April 29, 1985, has recommended

surplussing 105 acres of property administered by the Army Corps of Engineers. The Corps has regulatory authority over activities occurring in the waters of the United States under Section 10 of the River and Harbor Act and Section 404 of the Clean Water Act.

#### **1.1.4 U.S. GENERAL SERVICES ADMINISTRATION**

The United States under the authority of Executive Order Survey 11954, dated January 7, 1977 as amended by Executive Order Survey 12512, dated April 29, 1985, has recommended surplussing 105 acres of property administered by the Army Corps of Engineers. GSA is the Federal agency responsible for disposing of surplus Federal lands, in this case, by negotiated exchange to the State of Oregon in accordance with Part 101-47 of the Federal Property Management Regulations (41 CFR 101-47).

#### **1.1.5 SHARED AGENCY NEEDS AND RESPONSIBILITIES**

It is important to recognize that separate agency needs at South Tongue Point are interconnected. The situation at South Tongue Point requires the cooperation and coordination of all the involved agencies in order for each to meet its individual need. The mutual cooperation between agencies is a prudent and economical means for each agency to meet its need.

It is also important to note that, in spite of the differing missions of the various agencies, all have strong environmental mandates. These mandates ensure that meeting the different need of the various agencies will not compromise environmental considerations.

### **1.2 SCOPING**

In the development of this Draft Environmental Impact Statement (EIS), the Service has initiated action to assure compliance with the purpose and intent of the National Environmental Policy Act of 1969, as amended. Scoping activities were undertaken preparatory to developing the Draft EIS with a variety of Federal, State, and local entities (Scoping Report, Appendix A). Input on the proposed project was solicited through public notices, public meetings, personal contacts, telephone interviews, and correspondence. Key environmental issues directly associated with the potential development of the project were identified and enumerated in the Service's Scoping Report.

Issues identified during the scoping process that were selected for detailed environmental impact analysis are:

- Effects from choosing alternative development sites;
- Effects on wildlife populations;
- Effects on wildlife habitats, particularly wetlands;
- Effects on bald eagles;
- Effects on threatened fish species; and

- Effects on the local and regional economy.

In addition to these issues, which were reviewed in detail for their environmental consequences, several other issues were identified but were not considered for detailed analysis. While the concerns expressed were legitimate, actions that may be initiated would not have the potential to generate significant adverse impacts. These issues are briefly described below.

### **1.2.1 EFFECTS ON OTHER THREATENED, ENDANGERED, OR SENSITIVE SPECIES**

The proposed Alternatives would not have any effect on Columbian white-tailed deer, brown pelicans, or American peregrine falcons (Section 3.1.2.2.B -- Threatened, Endangered, and Sensitive Wildlife Species). The project area does not support Columbian white-tailed deer or brown pelicans. American peregrine falcons hunt in Cathlamet Bay; however, none of the alternatives would affect the peregrine falcon prey base.

### **1.2.2 EFFECTS OF DREDGING**

Resource agencies expressed concerns about the effects of dredging and the potential for re-suspension of contaminants that may have been deposited by past uses at the site, particularly following World War II (Section 3.1.1.4.C -- Sediments, and Section 4.1.1.8 -- Hazardous Materials). The results of the sedimentation study (Ogden Beeman & Associates, Inc., 1992) revealed a sedimentation rate of 0.2 to 0.4 feet per year. Previous sampling, as described in Section 3.1.1.9.B (Sediment Hazardous Materials), indicates that any hazardous materials would be located at least 4 feet below the sediment surface and would remain undisturbed by the dredging activity. No significant levels of contaminants were found during the dredging of the North Tongue Point navigation channel in 1989, and no significant levels of contamination were found 4 feet below the sediment surface during sediment sampling between the piers at North Tongue Point in 1990. Since less activity has occurred at South Tongue Point than at North Tongue Point, it is reasonable to assume that contamination levels would be even lower at South Tongue Point.

Dredging would not be necessary to initiate the project, but modest maintenance dredging may be needed in the future to accommodate moderate-draft vessels. Should channel maintenance dredging become necessary, additional detailed environmental studies would be required to assess any potential effects on fish and wildlife. Hydrographic surveys would be conducted to identify those areas requiring dredging. As previously stated, it is not expected that sediments would be contaminated; however, if sediments were found to be contaminated, dredging and disposal would be conducted in compliance with all appropriate requirements and regulations. If sediments were not contaminated, it is expected that the dredge material would either be deposited on spoil islands in the vicinity, or transported for ocean disposal.



### **1.2.3 EFFECTS ON MEDIATION PANEL AGREEMENT**

During the Scoping process, there were requests for an explanation of the effects and changes to the 1981 Mediation Panel Agreement in the context of the proposed development alternatives.

The Mediation Panel Agreement was developed to achieve consensus regarding appropriate development and management designations for several sites in the Astoria area, including South Tongue Point. This document contains findings, planning designations, and area policies for each site. Policies and provisions pertinent to South Tongue Point were adopted as part of the City of Astoria's and Clatsop County's Comprehensive Plan. In August of 1991, the City of Astoria and Clatsop County Comprehensive Plans were amended to enable the development of the proposed marine industrial park. Therefore, the Mediation Panel Agreement provisions for South Tongue Point are implemented through the local comprehensive plans. The Mediation Panel Agreement, as it relates to South Tongue Point, is no longer a controlling document.

The development proposed under Alternatives A and B (Section 2.3) is less extensive and has less adverse impacts on the environment than the development proposed under the Mediation Panel Agreement.

### **1.2.4 EFFECTS FROM NUCLEAR CAPABILITIES OF NAVY SHIPS**

During the scoping process, concern was expressed over the potential for the Navy ships proposed for deployment to have nuclear capabilities and present a nuclear hazard. The minehunter coastal craft proposed to be homeported at South Tongue Point do not have nuclear capabilities and, therefore, present no nuclear hazard. In addition, the Navy has no intention of bringing ships with nuclear capability to South Tongue Point, which is indicated by the fact that the berths planned for the South Tongue Point facility would not be large enough to receive nuclear ships.

## **1.3 THE DECISION-MAKING PROCESS**

This Draft EIS has been developed jointly by the Service, Region 1; the Corps, Portland District; GSA, San Francisco Office; and the Division. The Service is the lead agency, supervising the preparation of the Draft EIS.

This Draft EIS analyzes a reasonable range of alternatives and a Preferred Alternative. Adverse and beneficial impacts of each alternative are considered.

Upon completion of this Draft EIS, the responsible officials of the Service will select a Preferred Alternative for implementation. The decision to be made is which alternative will best achieve the goals of balancing economic development and wildlife resource protection. A Record of Decision will be produced by the Service following completion of the Final EIS.



Upon completion of this Draft EIS, the responsible officials of the Corps will adopt it as part of the permit process required by Section 404 of the Clean Water Act. A Record of Decision will be produced by the Corps following completion of the Final EIS.

Upon completion of this Draft EIS, the responsible officials of GSA will adopt the EIS in order to comply with National Environmental Policy Act requirements for the disposal and exchange of Federal properties. A Record of Decision will be produced by GSA following completion of the Final EIS.

#### **1.4 ORGANIZATION OF THE EIS**

This Draft EIS consists of an abstract, a summary, eight chapters, and three appendices. Following is a brief description of the content of each of the chapters and appendices.

- **Chapter 1** describes the purpose of and need for action, the scope of the EIS, issues to be addressed, the decision-making process, and the organization of the Draft EIS.
- **Chapter 2** describes the alternatives considered but dismissed from further consideration, alternatives considered for detailed analysis, and identifies the Service's Preferred Alternative.
- **Chapter 3** describes the environment that would be affected by the alternatives considered for detailed analysis. It describes the physical, biological, social, economic, cultural, and other environmental factors which may be affected.
- **Chapter 4** analyzes and compares the environmental consequences of implementing the various alternatives.
- **Chapter 5** describes the laws, statutes, regulations, executive orders, and policies with which the Federal agencies must be in compliance. This chapter also describes the consultation and coordination process for the Draft EIS and includes a current list of all agencies, organizations, and individuals receiving copies of this Draft EIS.
- **Chapter 6** lists all persons involved in making a significant contribution in the preparation of this Draft EIS.
- **Chapter 7** lists literature citations and personal communications referenced in this Draft EIS.
- **Chapter 8** is a glossary for the Draft EIS.

- **Chapter 9** is an index for the Draft EIS.
- **Appendices** include:
  - A. Scoping Report
  - B. Species Lists
  - C. Wetland Mitigation Plan

## **CHAPTER 2.0 ALTERNATIVES**

A wide variety of alternatives were identified through meetings with Federal, State, and local agencies; the scoping process; reviews of other relevant studies; and the master planning process. Alternatives were formulated in terms of (1) consistency with the Purpose and Need (Chapter 1.0), and (2) minimizing potential impacts to the natural environment. Alternatives were either eliminated from further study if they did not meet the project's objectives, or advanced for further study, as summarized below (Section 2.1) and described in detail in Section 2.2.

### **2.1 SUMMARY OF ELIMINATED AND ADVANCED ALTERNATIVES**

#### **2.1.1 SUMMARY OF ALTERNATIVES ELIMINATED FROM FURTHER STUDY**

The following alternatives were considered but eliminated from detailed study. These alternatives and the basis for eliminating them from further study are discussed in Section 2.1.

##### **Land Exchange Alternatives (Section 2.2.1)**

- Exchange of other State-owned lands for South Tongue Point;
- Screening South Tongue Point for further Federal use;
- Sale of South Tongue Point; and
- Delaying the disposal of South Tongue Point.

##### **Alternative Locations for a Marine Industrial Park (Section 2.2.2)**

- |                      |                        |
|----------------------|------------------------|
| ■ North Tongue Point | ■ West Skipanon        |
| ■ East Astoria       | ■ Warrenton Boat Basin |
| ■ Astoria Plywood    | ■ Tansy Point          |
| ■ Port of Astoria    | ■ East Hammond         |
| ■ South Astoria      | ■ Hammond Boat Basin   |
| ■ East Skipanon      |                        |

##### **Development Alternatives (Section 2.2.3)**

- Multi-tenant water-dependent development concepts;
- Single-tenant water-dependent development concepts;
- Non-water-related development; and
- Maximum build-out.

## **2.1.2 SUMMARY OF ALTERNATIVES ADVANCED FOR FURTHER STUDY**

The following alternatives were advanced for detailed study. These alternatives are described in detail in Section 2.3, following the discussion of the alternatives that were eliminated from detailed study.

- Alternative A - an exchange of State-owned islands for South Tongue Point and a multi-tenant marine industrial development at South Tongue Point (the Service's Preferred Alternative);
- Alternative B - an exchange of State-owned islands for South Tongue Point and a multi-tenant marine industrial development at South Tongue Point with the addition of a road connection to North Tongue Point; and
- Alternative C - the No Action Alternative (no land exchange and no development).

## **2.2 DESCRIPTION OF ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY**

The following alternatives were eliminated because they were not consistent with the Purpose and Need Statements (Chapter 1.0) or did not minimize potential adverse environmental impacts.

### **2.2.1 LAND EXCHANGE ALTERNATIVES**

#### **2.2.1.1 Exchange of Other State-Owned Lands**

The proposed exchange of State-owned islands within the administrative boundary of the Refuge for Federally-owned South Tongue Point meets the needs of both the Division and the Service. Other State-owned properties outside of the Refuge would not result in the mutually-beneficial exchange, and would not be consistent with the Purpose and Need Statements. Therefore, other State-owned lands were not considered for the purposes of the land exchange.

#### **2.2.1.2 Screening South Tongue Point for Further Federal Use**

GSA screened the disposal of South Tongue Point with other Federal agencies. No Federal agencies expressed an interest in obtaining the site.

#### **2.2.1.3 Sale of South Tongue Point**

Under GSA procedures, GSA may only consider the sale of property to private interests if disposal to a Federal agency or public agency is not concluded. As stated above, South Tongue Point would be exchanged for State-owned islands. Therefore, selling the site was eliminated from further consideration.



#### **2.2.1.4      Delaying the Disposal of South Tongue Point**

GSA could delay the disposal of South Tongue Point if this action were in the best interest of the Federal government. However, GSA has determined that there are no environmental reasons or prospective alternatives which would make a delay beneficial. The proposed exchange is considered to be the most reasonable disposal alternative.

#### **2.2.2    ALTERNATIVE LOCATIONS FOR A MARINE INDUSTRIAL PARK**

Several previous studies provide the basis for identifying reasonable alternative locations for the multi-tenant marine industrial development (Columbia River Estuary Study Taskforce [CREST], 1981; Mediation Panel Agreement, 1981; and Ogden Beeman & Associates, Inc., 1986). A series of parameters were used to evaluate alternative locations. These parameters provide the minimum requirements for a marine industrial development. Eleven sites were evaluated as reasonable alternatives to South Tongue Point and are discussed below (Section 2.2.2.2 -- Sites Considered).

##### **2.2.2.1      Parameters**

The following parameters were used to evaluate reasonable alternative locations to South Tongue Point.

##### **A.      Urban Location**

The multi-tenant marine industrial development would accommodate a variety of urban uses and would require complete urban services, including water and sewer. Statewide Planning Goal 14 (Urbanization) prohibits urban development outside of an urban growth boundary. Therefore, only sites that are currently within an urban growth boundary (i.e., already designated for urban uses) were considered.

##### **B.      Development Parcels**

Approximately 50 acres of upland area would be required to accommodate a medium-sized multi-tenant development. A 50-acre site would provide approximately 7 to 10 development parcels for water-dependent and general industrial uses. Tenants would share the cost of infrastructure extensions and improvements, as well as provide economic benefits within the community. Reducing the acreage of development parcels and the number of tenants would increase the length of time for the project to "break even" financially, increase the cost of infrastructure improvements for each tenant, as well as reduce local economic benefits.

Parcel depth from the shoreline would affect the attractiveness of the site for some water-dependent industrial uses. A 1,000-foot-length is the minimum depth to accommodate a modern

barge fabrication facility. Therefore, only sites that would provide at least one parcel with a 1,000-foot-depth from the water were considered.

#### **C. Water-Dependent and Non-Water-Dependent Areas**

The City of Astoria currently has few general industrial (non-water-dependent) sites that are available for new development. The City has expressed an interest in increasing the inventory of general industrial sites. Research conducted by the Division has revealed a strong market for sites that accommodate moderate-draft water-dependent industrial uses with access to the main navigation channel of the Columbia River. Therefore, sites that could accommodate a mix of water-dependent and non-water-dependent areas were considered to be reasonable alternative locations to South Tongue Point.

#### **D. Water Access**

Access to the main navigation channel would be necessary to accommodate water-dependent uses. Dredging has the potential for adverse environmental impacts and is expensive; therefore, only sites where pile-supported structures could be located where the water is currently deep enough to support moderate- and shallow-draft activities were considered. A minimum water depth of 18 feet Mean Lower Low Water (MLLW) is required to accommodate moderate-draft vessels.

Although deep-draft sites could physically accommodate moderate-draft tenants, moderate-draft use of a deep-draft site would be inefficient and uneconomical. Furthermore, deep-draft sites in urban areas are very limited. Preempting deep-draft tenants at deep-draft sites could lead to an increased demand for new deep-draft sites. The creation of a deep-draft site would require extensive dredging and result in adverse environmental impacts. Therefore, deep-draft sites were not considered to provide reasonable alternative locations for a moderate-draft marine industrial development.

#### **E. Road Access**

Access to the State highway system would be required to accommodate truck traffic as well as employee access to and from the site. It was considered important that vehicular access be able to avoid local streets and conflicts with other modes of transportation (e.g., railroad crossings).

#### **F. Rail Access**

Rail access may be necessary to accommodate some tenants within a marine industrial development. Although rail access was not considered to be critical, it would enhance the attractiveness of the site to some tenants. Therefore, the ability to provide rail access to a site was considered.

## **G. Environmentally Sensitive Areas**

Areas which are known to be environmentally sensitive were avoided as much as possible. As described in Section D, above, only sites where moderate-draft water access could be accommodated with pile-supported piers to reduce impacts to wetland areas were considered. Sites that would require dredging to accommodate moderate-draft tenants were not considered to be reasonable alternative locations. Furthermore, sites that would require the extensive filling of wetlands to create sufficient acreages of usable uplands were not considered to be reasonable alternatives.

## **H. Conflict with Existing or Proposed Use**

The Mediation Panel Agreement, as implemented by local comprehensive plans, identifies sites within the Astoria area as suitable for deep-draft access and large-scale water-dependent uses (e.g., bulk import facilities). There are relatively few sites within the Astoria area that could accommodate these uses. Therefore, sites that have been identified as suitable for deep-draft, large-scale uses were not considered to be reasonable alternative locations. Furthermore, some developed but unoccupied sites within the Astoria area are suitable for redevelopment of the prior use. These sites were also not considered to be reasonable alternative locations.

### **2.2.2.2 Sites Considered**

The sites that were considered for location of the proposed project are discussed below and are summarized in Table 2-1 and shown in Figure 2-1.

#### **A. North Tongue Point**

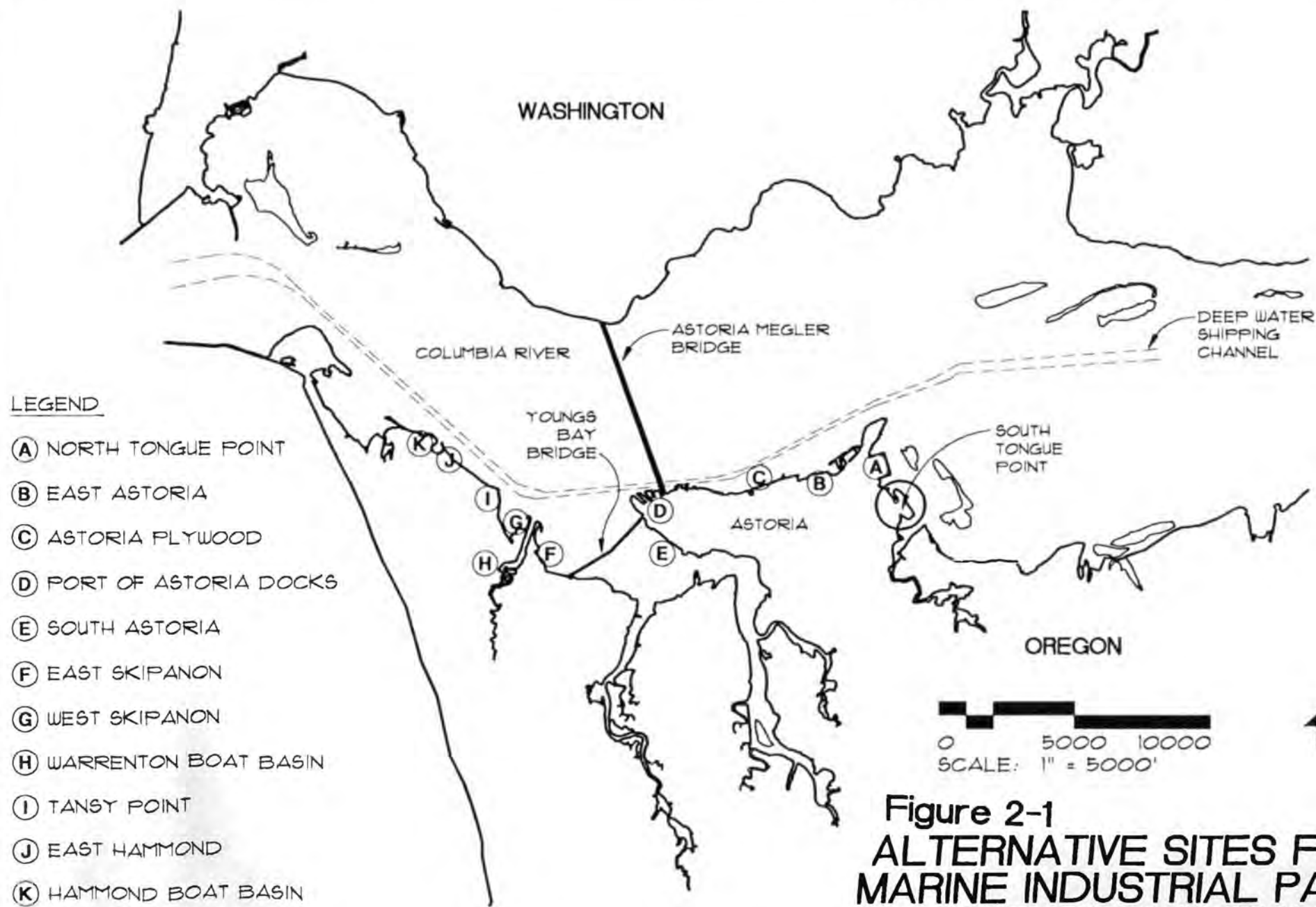
North Tongue Point is immediately north of South Tongue Point. The Division currently owns finger piers 1 through 5 and approximately 45 acres of the adjacent upland area. A 34-foot-deep access channel has been constructed to serve the North Tongue Point site and provides deep-draft access. The City of Astoria Comprehensive Plan designates North Tongue Point for a large-scale water-dependent use. As noted above, development for moderate-draft tenants would be an inefficient use of a deep-draft site.

North Tongue Point is currently under a long-term lease to be used as an automobile import operation and is not available for other uses at this time. The lease is for three years with an option to renew for 20 years. Therefore, the site is considered to be unavailable for 23 years. The Division, as the lessor, could not pursue another tenant for North Tongue Point without affecting the integrity of the lease.

**TABLE 2-1**  
**ALTERNATIVE SITES FOR MARINE INDUSTRIAL PARK**  
(Also see Figure 2-1)

|   | Site                       | Land Area                          | Available                              | Water Access                                  | Conflicts with Existing or Proposed Use                                                                                                                | Initial Dredging Required        |
|---|----------------------------|------------------------------------|----------------------------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| A | North Tongue Point         | 45 acres                           | No. Leased for Auto Export.            | Deep Draft                                    | Under lease for automobile import operation.                                                                                                           | Yes. Sediments are contaminated. |
| B | East Astoria (Alderbrook)  | 10 acres of infill parcels         | Small infill parcels only              | Deep Draft                                    | Suitable for commercial fishing and seafood processing.                                                                                                | Yes                              |
| C | Astoria Plywood            | 15 acres                           | Occupied by Astoria Plywood.           | Shallow to Moderate Draft                     | Would interfere with purchase and re-opening business.                                                                                                 | Yes                              |
| D | Port of Astoria            | 45 acres                           | Owned by Port of Astoria.              | Deep Draft                                    | Already developed and in use. Port Master Plan recommends limited container and bulk handling uses.                                                    | No                               |
| E | South Astoria (Youngs Bay) | 25 acres                           | Small infill parcels only.             | Shallow to Moderate Draft                     | Site is largely developed. Waterfront is constrained by bridge. Site is suitable for commercial fishing support, aquaculture, and recreational boating | Yes                              |
| F | East Skipanon              | 200 acres                          | Owned by Port of Astoria.              | Moderate Draft to west<br>Deep Draft to north | Comprehensive Plan designates area for a bulk cargo terminal.                                                                                          | Yes                              |
| G | West Skipanon              | 20 acres (vacant)                  | Yes                                    | Moderate Draft<br>Authorized                  | Comprehensive Plan limits use to support lumber mill at Warrenton.                                                                                     | Yes                              |
| H | Warrenton Boat Basin       | 50 acres                           | Yes                                    | Shallow Draft<br>Authorized                   | Site is suitable for commercial fishing support, recreation/tourism.                                                                                   | Yes                              |
| I | Tansy Point                | 90 acres                           | Occupied by residences and industries. | Deep Draft                                    | Comprehensive Plan designates site for a large (80- to 100-acre) water- dependent use (other than a coal terminal).                                    | No. Channel naturally scoured.   |
| J | East Hammond               | 11 acres (includes land and water) | Point Adams Packing located on-site.   | Deep Draft                                    | Site is suitable for continued use for seafood processing.                                                                                             | No                               |
| K | Hammond Boat Basin         | 50 acres (shorelands)              | Requires assembly of parcels.          | Shallow to Moderate Draft                     | Continued moorage and visitor recreation/ commercial uses.                                                                                             | Yes                              |





**Figure 2-1**  
**ALTERNATIVE SITES FOR**  
**MARINE INDUSTRIAL PARK**  
**SOUTH TONGUE POINT EIS**  
 June 19, 1992

The sediments between the finger piers and portions of the upland area are known to be contaminated and would require further investigation and remediation before the site could be developed. Water depth between the piers is less than 13 feet MLLW. A minimum depth of 18 feet is required to accommodate moderate-draft vessels.

The Navy has determined that North Tongue Point would not meet its needs for a minehunter coastal craft homeport. The existing steel finger piers (constructed in 1946 to store inactive ships after World War II) are in a deteriorated condition and would require a significant construction project to make a pier satisfactory to the Navy's needs. The Navy evaluated use of Pier 5 and found that it was substandard for emergency vehicle access turnaround and width, and the supporting piles and fendering system would need to be replaced. The existing piers do not include any infrastructure (e.g., sewer, water, or electricity) and the existing on-site utilities would require complete rehabilitation to provide these services.

North Tongue Point was rejected as an alternative site because it is not available, hazardous waste remediation would be required, it would result in an inefficient utilization of a site with deep-draft access, would require initial dredging between the finger piers to accommodate moderate-draft vessels, and would not be an acceptable site for the Navy minehunter coastal craft homeport.

#### **B. East Astoria**

The East Astoria site is located on Astoria's working waterfront, on the main navigation channel of the Columbia River. The site comprises approximately 10 acres of upland area in the form of "infill" parcels (i.e., a collection of smaller parcels that are located between existing developed parcels). Parcels that are considered to be available are in multiple ownerships. Therefore, individual purchases and consolidation would be required. The site is currently suitable for commercial fishing and seafood processing. Earlier studies of this site (Ogden Beeman & Associates, Inc., 1986) considered a 180-acre parcel that would be created largely from fill. Deep-draft access to the main Columbia River channel is currently provided offshore at the East Astoria site. Initial dredging or a very long access trestle would be required to accommodate moderate-draft vessels at the shoreline.

East Astoria was rejected as an alternative site because it provides insufficient upland area in the form of infill parcels in multiple ownerships, and would result in an inefficient utilization of a site with deep-draft access. The 1986 proposal to create a 180-acre parcel from fill was not considered to be environmentally or economically feasible for the purposes of the present project.

#### **C. Astoria Plywood**

The Astoria Plywood site is located on Astoria's working waterfront and comprises approximately 15 acres. The site is currently occupied by the Astoria Plywood buildings and

there is local interest in seeing this business reopen. Deep-draft access to the main Columbia River channel is currently provided offshore at the Astoria Plywood site. Initial dredging or a very long access trestle would be required to accommodate moderate-draft vessels at the shoreline.

The Astoria Plywood site was rejected as an alternative site primarily because there is insufficient upland area, the site is still operable as a plywood operation, and initial dredging would be required.

#### **D. Port of Astoria Docks**

The Port of Astoria is located at the western end of the City of Astoria, at the mouth of Youngs Bay. The docks are owned and maintained by the Port of Astoria, an active port district. The site currently includes warehouses, offices, and a tank farm. Approximately 45 acres of upland area were considered to be available, although most of this area is currently used by Port-related activities. Available water frontage at this site is limited to the existing piers. The Port Master Plan rated this area as suitable for grain, log handling, general cargo, limited container development, and limited development bulk (Columbia River Estuary Study Taskforce, 1981b) -- all of which are deep-draft activities. Deep-draft access is currently provided at this site. A multi-tenant moderate-draft industrial development at the Port site would conflict with existing and planned larger scale uses requiring deep-draft access.

The Port of Astoria Docks was rejected as an alternative site because it provides insufficient upland area which is not generally considered to be available, would result in an inefficient utilization of a site with deep-draft access, and would be inconsistent with the Port's Master Plan.

#### **E. South Astoria**

The area referred to as the South Astoria site includes several small parcels with frontage on Youngs Bay. Collectively, the sites comprise approximately 25 acres. The site is considered to be suitable for commercial fishing support, aquaculture, and recreational boating (Columbia River Estuary Study Taskforce, 1991). Existing water depths are approximately 6 feet MLLW. The site is located on the landward side of the Youngs Bay Bridge, a lift bridge that carries vehicular traffic with a vertical clearance of 45 feet (when down) and 80 feet (when up). The bridge can be raised and opened, respectively, upon request, although recently bridge openings are being curtailed.

The South Astoria site was rejected as an alternative site because it provides insufficient upland area, existing water depths would require major dredging activity, access to and from the site would be restricted by the Youngs Bay Bridge, and the site is considered to be suitable for commercial and recreational activities.

#### **F. East Skipanon**

The East Skipanon site comprises approximately 200 acres and is located on the east bank of the Skipanon Channel. The site is owned by the Port of Astoria. Water access to this site is provided by the Skipanon Channel or from Youngs Bay. Existing water depths in the channel range from 10 to 20 feet MLLW. The channel width is approximately 300 feet for a distance of one mile, with no turning basin. Accommodating traffic and docking requirements for several water-dependent tenants would not be feasible via the channel. Alternative water access to this site, via Youngs Bay, would require either substantial dredging of existing mudflats, or substantial filling into deeper water to provide water access for moderate-draft tenants. The City of Warrenton Comprehensive Plan designates the site for a bulk cargo terminal.

This site was eliminated as an alternative because it offers poor water access (from two sides), and the site is reserved for another use. Substantial dredging or filling would be required to provide water access, which was considered to be environmentally and economically infeasible. Access via the channel would constrain traffic to and from the site and would not be able to accommodate reasonable docking solutions for prospective tenants.

#### **G. West Skipanon**

The West Skipanon site comprises approximately 20 acres of vacant upland on the west bank of the Skipanon Channel. The site has no natural protection from the wind. Further, the City of Warrenton Comprehensive Plan limits use of the site to support the existing lumber mill at Warrenton. Water access to this site is provided by the Skipanon Channel with water depths ranging from 10 to 20 feet MLLW. The width of the Skipanon Channel is approximately 300 feet for a distance of one mile, with no turning basin. Accommodating traffic and docking requirements for several water-dependent tenants would not be feasible via the channel.

This site was eliminated as an alternative because it has insufficient uplands, dredging would be required, and it would be inconsistent with the Warrenton Comprehensive Plan. Water access via the channel would constrain traffic to and from the site and would not be able to accommodate reasonable docking solutions for prospective tenants.

#### **H. Warrenton Boat Basin**

The Warrenton Boat Basin provides approximately 50 acres of uplands, accessible via the Skipanon Channel. As discussed above (East Skipanon and West Skipanon), the width and length of the channel present constraints for water access and traffic to a multi-tenant marine industrial development. Most of the area is currently used for commercial and recreational boating activity. The available land is separated from direct water access by a public street. Use of this site for a marine industrial development would create traffic conflicts with the small craft that currently use the site. Water depths in the channel adjacent to the basin range from



9 to 12 feet MLLW and would require extensive dredging to accommodate moderate-draft vessels.

Although this site has sufficient acreage, it was eliminated as an alternative because a marine industrial development would be incompatible with the existing use of the site and extensive dredging would be required to accommodate moderate-draft vessels. Similar to the East and West Skipanon sites, access via the channel would constrain traffic to and from the site and would not be able to accommodate reasonable docking solutions for prospective tenants.

#### **I. Tansy Point**

Tansy Point comprises approximately 90 acres and is within the City of Warrenton. The site is currently occupied by residences and businesses. Deed restrictions on approximately 11.5 acres of this site limit use to a waterfront park or residential development, or to remain undeveloped. The Warrenton Comprehensive Plan designates the remaining area for a large-scale water-dependent user. Deep-draft access is currently available and the channel is naturally scoured. Access to U.S. Highway 101 is approximately two to three miles to the south. The site has no natural protection from the wind or the Columbia River currents.

This site was rejected as an alternative site because it would require relocation of existing land uses and purchase of the property, would be an inefficient use of a deep-draft site, and has poor accessibility. Further, use of the site as a multiple-tenant, moderate-draft development would be inconsistent with the Warrenton Comprehensive Plan designation and deed restrictions.

#### **J. East Hammond**

The East Hammond site includes approximately 11 acres of land and water area. Point Adams Packing (a seafood processing operation) is located on-site, and the site is considered to be suitable for this continued use. Deep-draft access is currently provided. The site has no natural protection from wind and the Columbia River currents.

This site was eliminated from further consideration because it provides insufficient upland area and it is suitable for continued use as a seafood processing operation. It would also result in the inefficient use of a deep-draft site.

#### **K. Hammond Boat Basin**

The Hammond Boat Basin includes approximately 50 acres of shorelands and minimal upland area. Upland parcels are currently in multiple ownerships and would require purchase and consolidation. Current use of the site includes commercial and recreational boating. A regional conference center has been proposed for the site, which would be consistent with the existing commercial and recreational boating activity in this area. Water depths in the basin range from

1 to 20 feet MLLW and would require extensive dredging to accommodate moderate-draft vessels.

This site was eliminated from further consideration because it provides insufficient upland area, would conflict with the existing and proposed use of the site, and would require initial dredging.

#### **L. Conclusion**

The 11 sites described above were eliminated for further study for one or more of the following reasons:

1. Available upland area is inadequate (often in the form of infill parcels or requires filling to create additional land area);
2. Deep-draft water access is provided but not needed for the proposed multi-tenant development and would result in an inefficient use of the site;
3. Dredging to provide moderate-draft access would be required;
4. Other uses are documented as being preferred uses; or
5. The site is considered suitable for a single, large use (e.g., a bulk cargo terminal).

If the multi-tenant marine industrial development were constructed at another site, there would be no land exchange. The State-owned islands would not be transferred to Federal ownership and the mutually-beneficial land exchange would not be effected. Therefore, locating the project at other sites would not be consistent with the Purpose and Need Statements (Chapter 1.0).

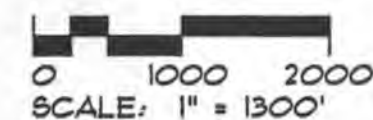
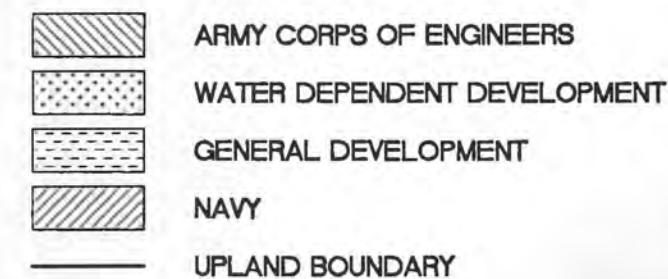
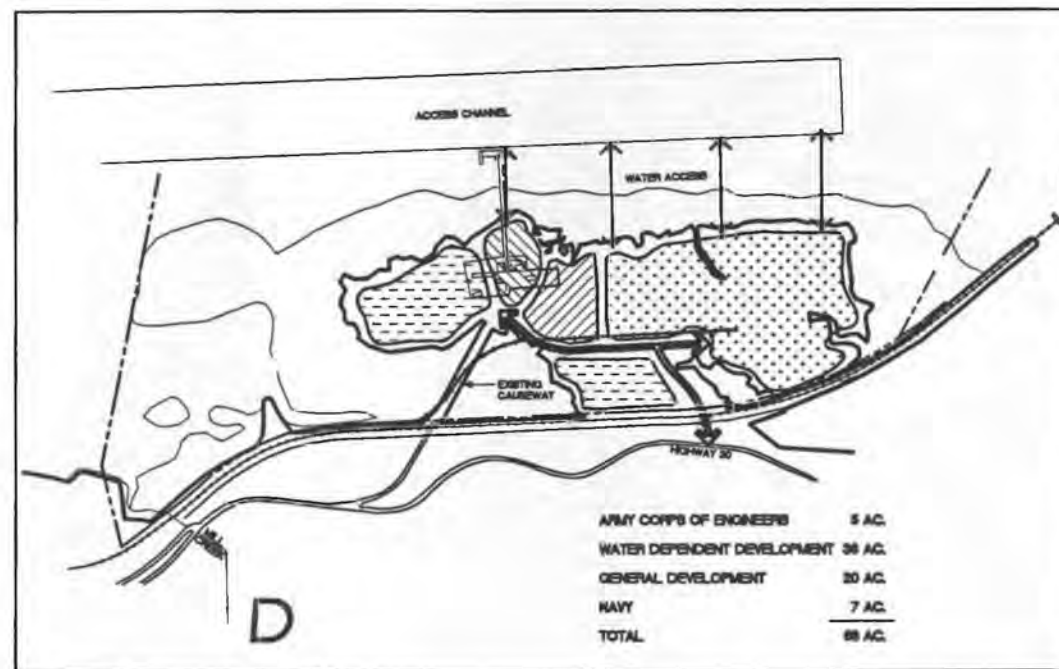
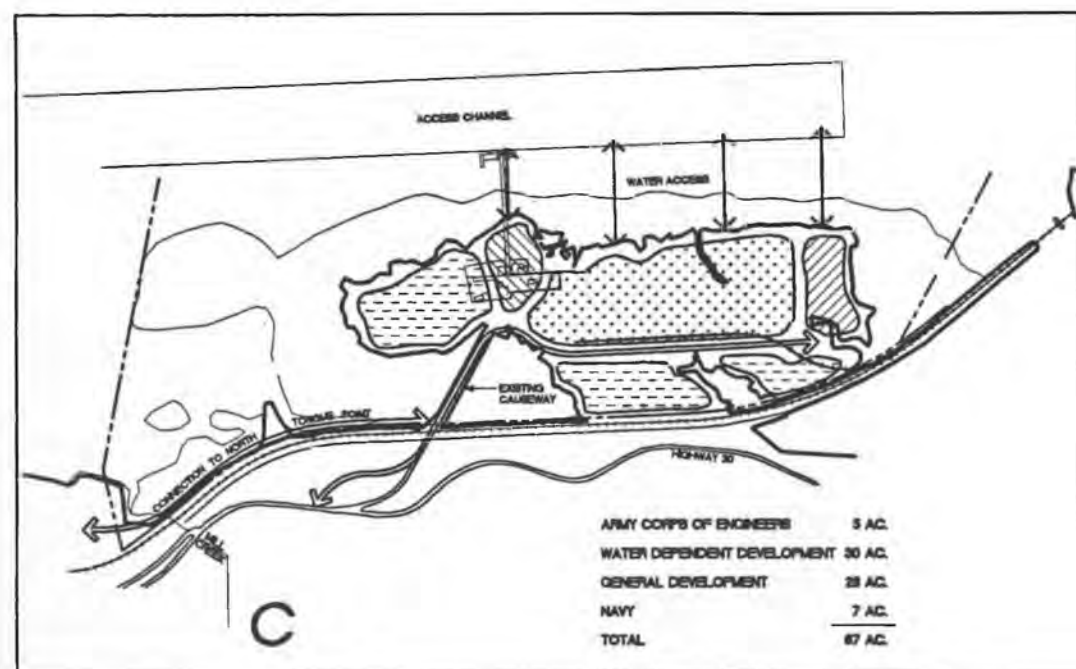
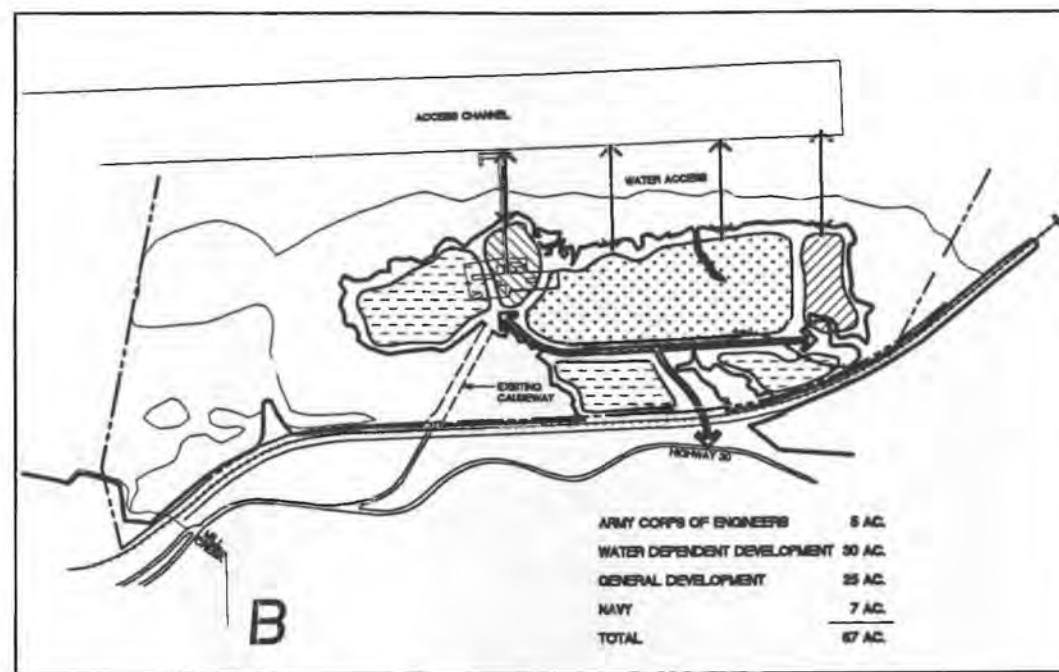
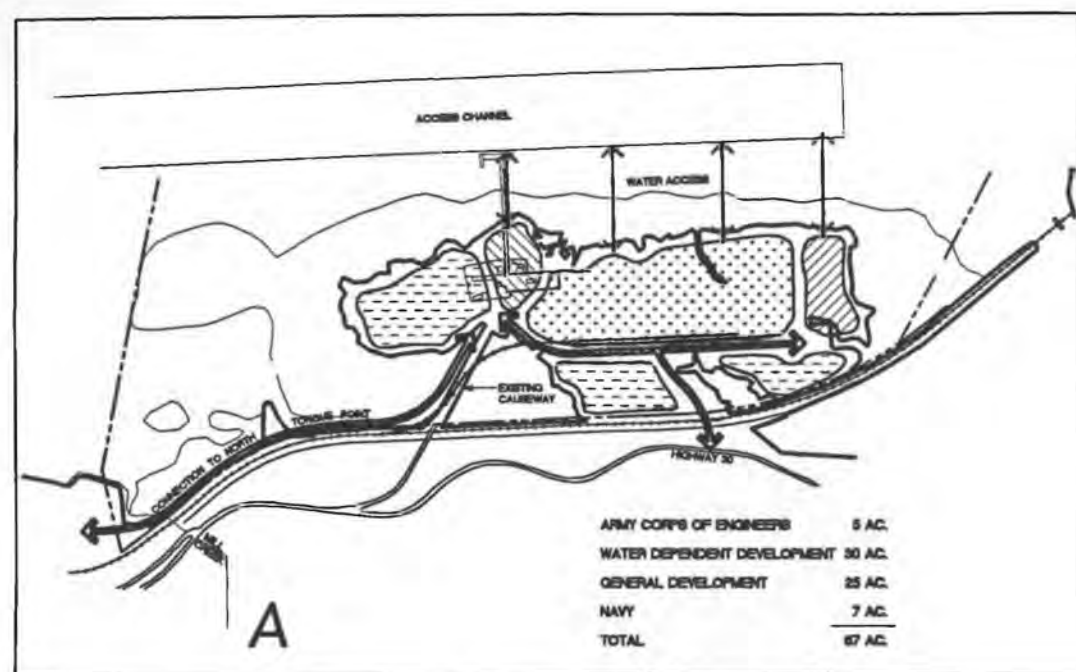
### **2.2.3 DEVELOPMENT ALTERNATIVES**

#### **2.2.3.1 Multi-Tenant Development Concepts at South Tongue Point**

##### **A. Development Concepts**

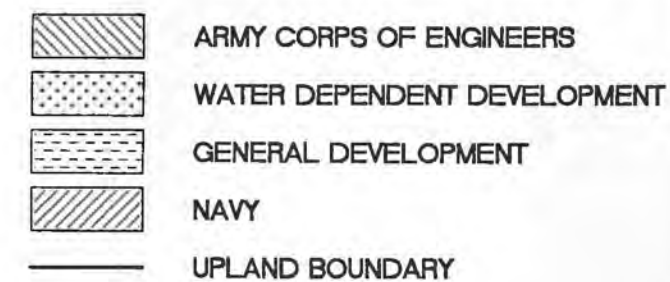
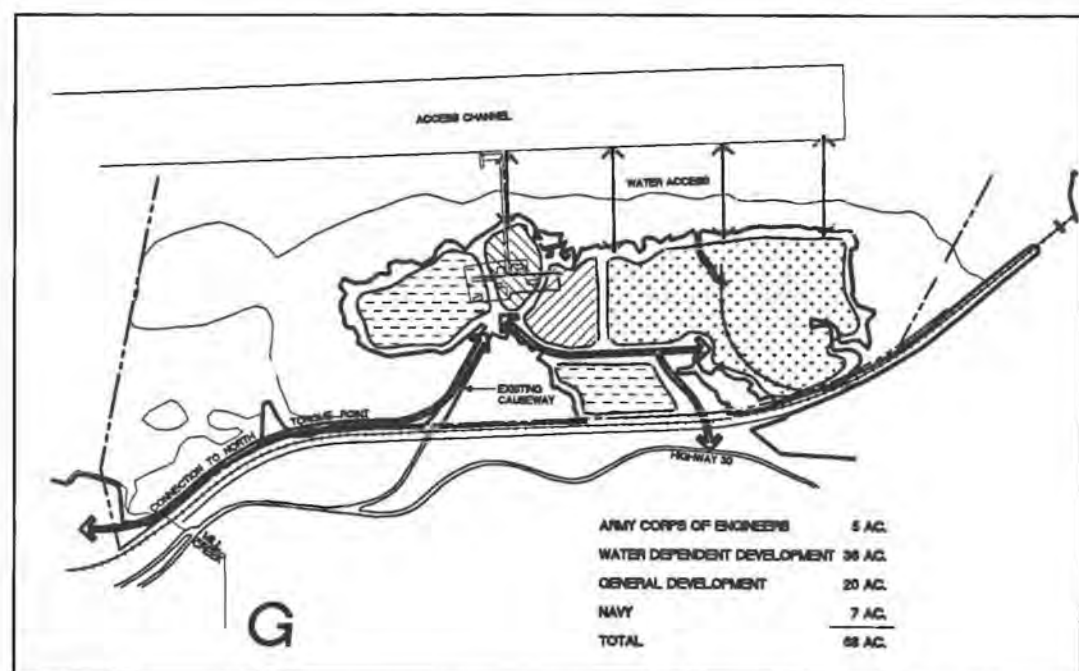
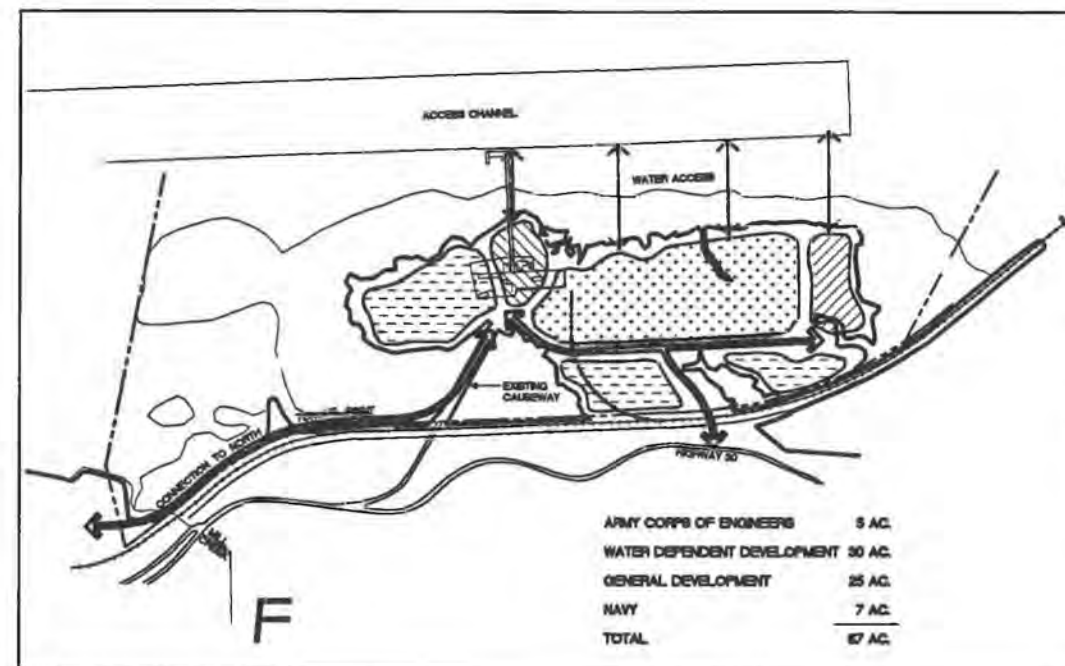
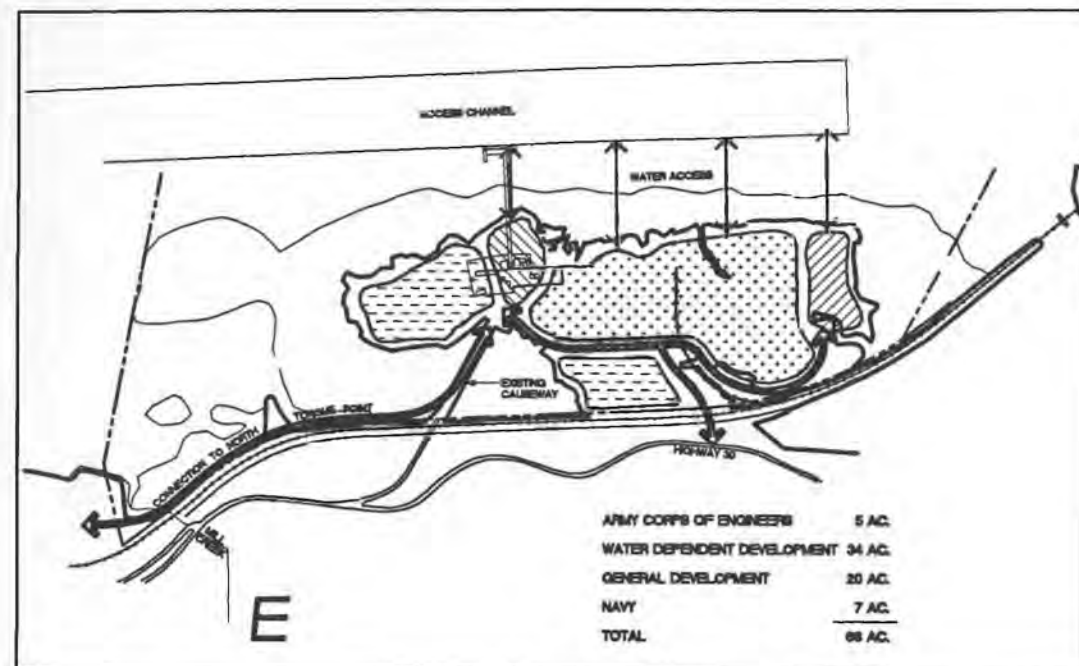
Seven concept plans for multi-tenant developments at South Tongue Point were identified and evaluated during a master planning process (Figure 2-2). The purpose of the master planning process was to identify reasonable multi-tenant site layouts at South Tongue Point. This process focused on layouts that could accommodate a mix of water-dependent and non-water-dependent uses, provide water and land access (for vehicles and rail), and provide an option for a road connection to North Tongue Point.

A modified version of Development Concept E provides the basis for the Service's Preferred Alternative. Subsequent to the master planning process, Development Concept E was modified to reduce impacts to wetlands. Table 2-2 lists the features that all of the concepts have in common. Table 2-3 provides a comparison of the key differences between the concepts.



**Figure 2-2**  
**DEVELOPMENT CONCEPTS**  
**SOUTH TONGUE POINT EIS**  
June 19, 1992





**Figure 2-2**  
**DEVELOPMENT CONCEPTS**  
**SOUTH TONGUE POINT EIS**  
June 19, 1992



**TABLE 2-2**  
**COMMON FEATURES OF DEVELOPMENT CONCEPTS**  
**A THROUGH G**

- 
1. Development areas are largely within existing uplands.
  2. The total upland area is approximately 73 acres including the existing Corps facility.
  3. Water access would be via a 300-foot-wide navigation channel, currently suitable for moderate-draft vessels.
  4. A seven-acre site would be occupied by the U.S. Navy to homeport two minehunter coastal craft.
  5. The Navy would require a 400-foot-long pier with a 300-foot-long mooring area (a total length of 700 feet).
  6. The Corps facility and pier would remain at the existing location, but within a reduced site area.
  7. Site development would include construction of a new north-south internal access road.
  8. Water-dependent uses would be located mainly south of the Corps pier and east of the internal access road with water access to the navigation channel.
  9. General industrial (non-water-dependent) uses would be located west and north of the internal access road, without water access
  10. Intertidal wetlands at the northern and southern ends of the site are not within proposed development areas.
  11. Wetlands would be filled only when needed to create a uniform upland boundary and to allow the reasonable and efficient placement of access roads. Wetland fills would require authorization in accordance with Section 404 of the Clean Water Act.
-

TABLE 2-3

## SUMMARY COMPARISON OF ALTERNATIVE DEVELOPMENT CONCEPTS\*

(Also see Figure 2-2)

| Concept | New Access<br>from U.S. 30 | Existing<br>Causeway                                             | Rail<br>Access                                          | Site<br>Layout                                                                          | Connection<br>to North<br>Tongue Point | Initial<br>Dredging<br>Required |
|---------|----------------------------|------------------------------------------------------------------|---------------------------------------------------------|-----------------------------------------------------------------------------------------|----------------------------------------|---------------------------------|
| A       | Yes                        | Remains; becomes<br>secondary access.                            | New spur from north.<br>Serves entire site.             | Navy - southern end,<br>WD - eastern side,<br>GD - north and west<br>(three parcels).   | Yes                                    | No                              |
| B       | Yes                        | Closed. Causeway<br>removed.                                     | New spur from south.<br>Serves southern end<br>of site. | Navy - southern end,<br>WD - eastern side,<br>GD - north and west<br>(three parcels).   | No                                     | No                              |
| C       | No                         | Remains as primary<br>access. U.S. 30<br>intersection realigned. | New spur from south.<br>Serves entire site.             | Navy - southern end,<br>WD - eastern side,<br>GD - north and west<br>(three parcels).   | Yes                                    | No                              |
| D       | Yes                        | Remains; becomes<br>secondary access.                            | New spur from north.<br>Serves entire site.             | Navy - south of Corps,<br>WD - eastern side,<br>GD - north and west<br>(three parcels). | No                                     | Yes                             |
| E       | Yes                        | Remains; becomes<br>secondary access.                            | New spur from south.<br>Serves central site.            | Navy - southern end,<br>WD - eastern side,<br>GD - north and west<br>(two parcels).     | Yes                                    | No                              |
| F       | Yes                        | Remains; becomes<br>secondary access.                            | New spur from south.<br>Serves central site.            | Navy - southern end,<br>WD - eastern side,<br>GD - north and west<br>(three parcels)    | Yes                                    | No                              |
| G       | Yes                        | Remains; becomes<br>secondary access.                            | New spur from south.<br>Serves central site.            | Navy - south of Corps,<br>WD - eastern side,<br>GD - north and west<br>(two parcels).   | Yes                                    | Yes                             |

WD= water-dependent  
development  
GD= general development  
(non-water-dependent  
development)

\* This table highlights the differences between alternatives. Table 2-1 highlights the similarities.

**Development Concept A:** was eliminated from further consideration because it would require wetland fill for the new railroad spur, and the maximum east-west dimension of the water-dependent parcels would be approximately 600 feet.

**Development Concept B:** was eliminated from further consideration because the railroad spur from the south would reduce the area available for non-water-dependent use, the minimum east-west dimension of the water-dependent parcels would be approximately 600 feet, and there would be no option for a connection to North Tongue Point.

**Development Concept C:** does not include a new access road. The existing intersection with U.S. Highway 30 would be realigned, but would still be substandard. Right-of-way acquisition would cause residential displacements and driveway relocations. The at-grade railroad crossing would remain and require substantial upgrading. The railroad spur from the south would reduce the area available for non-water-dependent use. The east-west dimension of the water-dependent parcels would be approximately 600 feet. Therefore, this concept was eliminated from further study because of road and rail access, land use impacts, width of the water-dependent parcels, and reduction in developable areas.

**Development Concept D:** locates the Navy facility immediately south of the existing Corps facility. Initial dredging would be required to accommodate the Navy's moderate-draft vessels at this location. In order to accommodate the Navy at this location, one of the following scenarios would be required:

- Initial dredging of 60,000 cubic yards of sediments and increasing the trestle length by 150 feet. A longer trestle is not considered to be feasible because it would create a navigation obstacle in the channel. A longer trestle would also increase construction costs and the difficulty of transporting equipment and employees between the upland facilities and the water. Shading and construction impacts would also be increased with a longer pier.
- Initial dredging of 120,000 cubic yards and not increasing the length of the pier.

Dredging a small pocket to create berthing space adjacent to the Corps would also increase the need for maintenance dredging. The aquatic topography in this area is gently sloping and approaching a state of equilibrium. The creation of an irregular bottom profile with steeper slopes than the surrounding area would result in faster localized sedimentation rates (relative to the surrounding area) and would require more frequent maintenance dredging. Dredging 60,000 to 120,000 cubic yards in order to initiate the project would also result in the immediate disturbance to a large subtidal area and habitat.

This concept was eliminated because initial dredging (and more frequent maintenance dredging) would be required to accommodate the Navy's moderate-draft vessels at this location. A longer pier would also be less efficient and more expensive. There would be additional wetland fill for

the new railroad spur, and there would be no option for a connection to North Tongue Point. In conclusion, this alternative was not considered to be feasible or environmentally preferable.

**Development Concept E:** requires wetland fill for the new railroad spur. This concept was later modified to eliminate the wetland fill associated with the railroad spur and is the basis of the master plan for proposed development at South Tongue Point (Section 2.3.1 -- Alternative A). Development Concept E provides improved road and rail access, maximizes the east-west dimension of upland area available for water-dependent uses, minimizes wetland fill associated with development on South Tongue Point, and provides an option for a connection to North Tongue Point.

**Development Concept F:** was eliminated from further study because the maximum east-west dimension of the water-dependent parcels would be approximately 600 feet. The size and dimensions of the developable area would limit the range of tenants that could be accommodated at the site.

**Development Concept G:** is similar to Development Concept D, with the Navy located immediately south of the existing Corps facility. It is different from Development Concept D because it includes an option for a connection to North Tongue Point. As discussed under Development Concept D, this concept was eliminated because initial dredging would be required, and a longer pier would be an obstacle in the channel and would not be cost-effective. This alternative was not considered to be feasible or environmentally preferable.

#### **B. Smaller Multi-Tenant Marine Industrial Development at South Tongue Point**

The master plan for development at South Tongue Point has been designed to minimize impacts to areas that have been identified as environmentally sensitive. Wetlands are largely avoided (less than one acre of fill is required for the Service's Preferred Alternative) and proposed development has been located away from the northern and southern ends of South Tongue Point (to minimize impacts to eagle foraging areas). The master plan assumes that water-dependent tenants would require moderate-draft access which can be accommodated by existing water depth without any initial dredging.

The financial feasibility of development at South Tongue Point is based on maximizing economic development opportunities subject to environmental constraints. Financial feasibility is a function of infrastructure costs (roads, sewers, and water systems), lease terms, and various financing options. It should be noted that any development at South Tongue Point would require the extension of all utilities and public services, and therefore, these costs would not be reduced with a smaller development plan. A preliminary financial impact analysis has determined that 50 acres of leasable area is the minimum amount of development that would be financially feasible. Of the 73 acres of upland area at South Tongue Point, approximately 46 acres of leasable area is shown on the master plan, and approximately 7 acres are reserved for access and



circulation. The balance of the site is left in a natural condition or already developed and used by the Corps.

The master plan was specifically designed to minimize environmental impacts. Therefore, there would be no apparent purpose to further reduce the developable area at South Tongue Point. A reduction in the developable area would diminish the number of jobs created; reduce economic benefits to the City, County, and State; and would not reduce the costs of extending infrastructure to the site. Therefore, this alternative was eliminated from further study because the master plan represents a reasonable balance of environmental constraints and economic development opportunities. If additional environmentally sensitive areas are further identified during preparation of the Draft EIS, modifications to the master plan would be considered.

#### **C. Navy at North Tongue Point and Multi-Tenant Development at South Tongue Point**

North Tongue Point, as an alternative site for a multi-tenant development, has been discussed above (Section 2.2.2.2.A -- North Tongue Point). This section addresses North Tongue Point as an alternative site for the Navy as a single-tenant development; however, many of the issues are similar for a single- and multi-tenant development. Although this alternative is addressed for the purposes of this Draft EIS, it is important to note that the Navy would not go to North Tongue Point. The result of the Navy's site selection process is that South Tongue Point is the only site in Oregon that would meet the requirements of the minehunter coastal craft homeport.

Assuming the Navy was interested in North Tongue Point, there are many other reasons why it is not a reasonable alternative. First, North Tongue Point is currently under a long-term lease and the Division, as the lessor, could not pursue another tenant for North Tongue Point without affecting the integrity of the lease. Second, North Tongue Point is known to be contaminated and would require further investigation and remediation before the Navy could occupy the site. The first minehunter coaster craft would require a homeport facility in 1993. North Tongue Point could not possibly be available within this time frame. Third, deep-draft access is provided, but not required by the moderate-draft minehunter coastal craft.

If the site were available, extensive redevelopment of the facility would be needed to accommodate the Navy homeport requirements. The portion of North Tongue Point that is owned by the State includes steel finger piers that were constructed in 1946. The piers are in a deteriorated and substandard condition. Redevelopment of the site would include the removal of a finger pier, construction of a new berthing pier, and initial dredging between the existing piers to accommodate the moderate-draft minehunter coastal craft.

Even assuming North Tongue Point was considered to be a reasonable alternative to South Tongue Point for the Navy facility, this alternative would not only include all the costs of improving South Tongue Point for the marine industrial development, it would also include the costs of dredging, hazardous material remediation, and site improvements at North Tongue

Point. Therefore, this alternative was eliminated for the reasons discussed above, as well as the increased cost of development at two sites without any increased benefit.

Development of the Navy homeport facility at North Tongue Point would conflict with and largely preclude the planned use of the site for large-scale uses. This alternative was rejected because the North Tongue Point site is not available, there are known hazardous materials in the upland and subtidal areas, it would provide reduced economic benefits to Astoria, and it would result in the inefficient utilization of the existing deep-draft channel and conflict with planned large-scale, deep-draft uses. This alternative would also include all the cost of infrastructure improvements at South Tongue Point, without any additional benefits.

#### **2.2.3.2      Single-Tenant Development Concepts**

##### **A.      Large-Scale Industrial Use at South Tongue Point**

The CREST Mediation Panel Agreement considered a coal transshipment facility at South Tongue Point and North Tongue Point as a single-tenant development. With a water-dependent development option, the following activities were envisioned at South Tongue Point:

- An "access corridor" to North Tongue Point to accommodate rail, conveyer, road access, or a combination of all three;
- Dredging to provide a 25-foot-deep (MLLW) access channel;
- A spur railroad trestle from the existing Burlington Northern Railroad line and across wetlands and wetland fill to accommodate new railroad tracks; and
- Fill in the wetland area on the south side of the existing causeway.

North Tongue Point is now under a long-term lease for an automobile import facility, and is no longer available for other uses. A 1991 update by CREST of the 1981 Economic Evaluation found that regional market conditions would no longer support a coal transshipment or other large-scale container facilities at the Tongue Point sites. Furthermore, South Tongue Point could not provide deep-draft water access required by these vessels without extensive dredging. Therefore, this alternative was eliminated from further study because North Tongue Point is not available for an integrated development, market conditions would not support the facility, this facility would not be consistent with Astoria's Comprehensive Plan, and dredging would be required.

##### **B.      Navy as Single-Tenant Development at South Tongue Point**

The Navy's homeport facility requires seven acres of upland area and a pier to berth two minehunter coastal craft. If the Navy were the only new tenant at South Tongue Point, the facility could be located wherever an acceptable balance could be found between environmental constraints, development costs, and operation and efficiency. However, given existing water depths, only the southern end of South Tongue Point could accommodate the Navy facility

without any initial dredging. Dredging would be required at all other locations. Initial dredging quantities of 60,000 (with a longer pier) to 120,000 cubic yards would be required to locate the Navy to the south of the Corps. A longer pier is not feasible for the reasons described above (Section 2.2.3.1.A -- Development Concepts). Initial dredging in a small, localized area would also require more frequent maintenance dredging.

South Tongue Point is one of the few upland industrial areas inside the Astoria Urban Growth Boundary that is not committed to deep- or shallow-draft uses. To commit the 73 acres of developable upland area exclusively to the Corps and the Navy (which collectively would use less than 15 acres) would result in the inefficient utilization of the site.

Major infrastructure improvements would be required even if the Navy is the only new tenant at South Tongue Point. A single-tenant development option would not allow the cost of these improvements to be shared by multiple tenants. Economic development opportunities (in terms of job creation and other economic benefits for Astoria and Clatsop County) would be greatly reduced compared to a multi-tenant marine industrial development. The Navy would generate approximately 125 jobs (direct employment), whereas the multi-tenant development would generate approximately 610 jobs (direct, indirect, and induced) at build-out (Section 3.1.3.2 -- Socioeconomics). Therefore, a single-tenant development results in decreased economic benefits.

This alternative was eliminated from further study because of the inefficient utilization of industrial land, the cost of extending infrastructure for one new tenant, the reduction in economic benefits, and the impacts associated with initial dredging or a longer pier.

#### **C. Navy as Single-Tenant Development at North Tongue Point with no Private Development at South Tongue Point**

North Tongue Point, as an alternative site for a multi-tenant development, has been discussed above (Section 2.2.2.2.A -- North Tongue Point). This section addresses North Tongue Point as an alternative site for the Navy as a single-tenant development with no development at South Tongue Point. Although this alternative is addressed for the purposes of this Draft EIS, it is important to note that the Navy would not go to North Tongue Point. The result of the Navy's site selection process is that South Tongue Point is the only site in Oregon that would meet the requirements of the minehunter coastal craft homeport.

Assuming the Navy was interested in North Tongue Point, there are many other reasons why it is not a reasonable alternative. First, the Division has proposed a multi-tenant development because of the associated economic and social benefits associated with job creation and increased tax revenues to the local and State governments. The Navy is expected to generate 125 jobs, whereas the multi-tenant development would generate approximately 610 jobs (direct, indirect, and induced; see Section 3.1.3.2 -- Socioeconomics). Therefore, a single-tenant development results in decreased economic benefits. Second, North Tongue Point is currently under a long-



term lease and the Division, as the lessor, could not pursue another tenant for North Tongue Point without affecting the integrity of the lease. Third, North Tongue Point is reported to be contaminated and would require further investigation and remediation before the Navy could occupy the site. The first minehunter coaster craft would require a homeport facility in 1993. North Tongue Point could not possibly be available within this time frame. Fourth, deep-draft access is provided, but not required by the moderate-draft minehunter coastal craft.

If the site were available, extensive redevelopment of the facility would be needed to accommodate the Navy homeport requirements. The portion of North Tongue Point that is owned by the State includes steel finger piers that were constructed in 1946. The piers are in a deteriorated and substandard condition. Redevelopment of the site would include the removal of a finger pier, construction of a new berthing pier, and initial dredging between the existing piers to accommodate the moderate-draft minehunter coastal craft.

Development of the Navy homeport facility at North Tongue Point would conflict with and largely preclude the planned use of the site for large-scale uses. This alternative was rejected because the North Tongue Point site is not available, there are known hazardous materials in the upland and subtidal areas, it would provide reduced economic benefits to Astoria, and it would result in the inefficient utilization of the existing deep-draft channel and conflict with planned large-scale, deep-draft uses. This alternative would not include the mutually-beneficial land exchange. Therefore, this alternative would not be consistent with the Purpose and Need Statements or the objective of minimizing potential impacts to the environment.

#### **2.2.3.3      Non-Water-Related Industrial Development Concept at South Tongue Point**

Development at South Tongue Point solely with non-water-related, or general industrial, uses would not be an efficient use of the property since non-water-related uses do not require water access. Therefore, this would represent a foregone opportunity for water-dependent uses to locate in the Astoria area. A recent analysis of South Tongue Point (Powell, Goss & Associates, 1990) conducted as part of the appraisal for the land exchange, found that the highest and best use of the property is a mixed-use marine industrial development.

The City of Astoria Comprehensive Plan and Zoning Map designates only the areas at South Tongue Point that do not have water access as available for general industrial uses. Therefore, only a portion of the property could be developed, however, full public facility improvements would still be required. This alternative was eliminated from further study because it would result in the inefficient use of the site and would not be consistent with the City of Astoria Comprehensive Plan.



#### **2.2.3.4 Maximum Build-Out at South Tongue Point**

A maximum build-out scenario for development at South Tongue Point was described by CREST in 1979. This scenario included the construction of a bulkhead encompassing North and South Tongue Point, extensive filling of wetlands to create up to 400 acres of development area, and dredging of the access channel to accommodate deep-draft vessels. Dredging and filling activities would affect wetlands, bald eagle habitat, and juvenile salmonid habitat. Therefore, this alternative was eliminated from further study because it would have extensive adverse environmental impacts. A deep-draft channel to South Tongue Point would require extensive dredging; and as noted above, North Tongue Point is committed to another use.

### **2.3 DESCRIPTION OF ALTERNATIVES CONSIDERED FOR DETAILED STUDY**

As the previous text details, more than 20 alternatives (including alternative sites, development concepts, and single versus multi-tenant developments) were considered before limiting the alternatives to be advanced for detail study to the following:

#### **2.3.1 ALTERNATIVE A - DEVELOPMENT OF SOUTH TONGUE POINT**

Alternative A comprises two elements: (1) the land exchange, and (2) the multi-tenant marine industrial development. These elements are described below.

Because Alternative A includes the development of South Tongue Point only and does not include a road connection to North Tongue Point, this alternative would not be consistent with the City of Astoria Comprehensive Plan. However, this option responds to concerns expressed by Federal and State regulatory agencies related to the four acres of wetland fill in the Mill Creek mudflats area that would be required to construct the road. These concerns focus mainly on the possible impacts to bald eagles from disturbances to and loss of this foraging habitat. Alternative A is the Service's Preferred Alternative because it would avoid the wetland fill and foraging habitat disturbances associated with the road connection to North Tongue Point.

##### **2.3.1.1 Land Exchange**

###### **A. Screening for Public Use**

As a result of GSA's Notice of Availability to eligible public agencies, the Division expressed an interest in acquiring South Tongue Point. The property would be acquired from the Federal government through an exchange of State-owned islands within the administrative boundary of the Refuge. Ownership of the islands would then be transferred to the Service.

## **B. Selection of Islands**

The Division currently owns several islands within the administrative boundary of the Refuge. The State-owned islands would be exchanged through GSA to the Service for South Tongue Point based on an equivalent dollar value. The value of the islands is being established through a formal appraisal process. If the collective value of the islands is equivalent to South Tongue Point, all of the islands would be included in the exchange. If the collective value of the islands is more than the value of South Tongue Point, the Service would select the islands that best meet the goals of the Refuge and have an appraised value that is equivalent to South Tongue Point (Figure 2-3). If the value of the islands is less than the value of South Tongue Point, the State would need to provide additional compensation to complete the land exchange.

Table 2-4 identifies State-owned lands within the administrative boundary of the Refuge and the priority that the Service attaches to acquiring these lands. Priorities are based upon habitat values and wildlife management potential. Figure 2-3 shows the location of the potential exchange lands within the Refuge.

### **2.3.1.2 Multi-Tenant Marine Industrial Development**

The proposed multi-tenant marine industrial development at South Tongue Point is a modified version of Development Concept E (see Section 2.2.3.1.A -- Development Concepts at South Tongue Point). The development program would include a variety of water-dependent and general industrial uses and is described below (Figures 2-4 and 2-5).

The Division would provide the necessary on-site infrastructure to support the marine industrial development. Individual parcels would be leased by the Division to tenants within the development. The Division would retain ownership of South Tongue Point, exclusive of the area owned by the Federal government and occupied by the Corps. Individual leases would address requirements for contingency plans for localized spills, stormwater management, and other site- and tenant-specific issues.

Two phases of activity are proposed. Phase 1 involves site infrastructure improvements and construction of marine industrial facilities (including buildings, parking areas, and pile-supported structures). Full infrastructure improvements would be provided prior to occupancy by tenants. Construction of infrastructure would begin in 1993. Construction of buildings and piers would occur at a rate supported by market conditions. The Navy is expected to occupy South Tongue Point in late 1993, and would most likely be the first tenant on the site.

During Phase 2, maintenance dredging may be required to keep the access channel and turning basin at the required 18 feet MLLW. Maintenance dredging would be needed only if the channel became too shallow for passage by moderate draft vessels. At the present time, the channel is 19 to 32 feet MLLW. The shoaling rate of the channel is approximately 0.2 to 0.4 feet per year (Ogden Beeman & Associates, Inc., 1992).

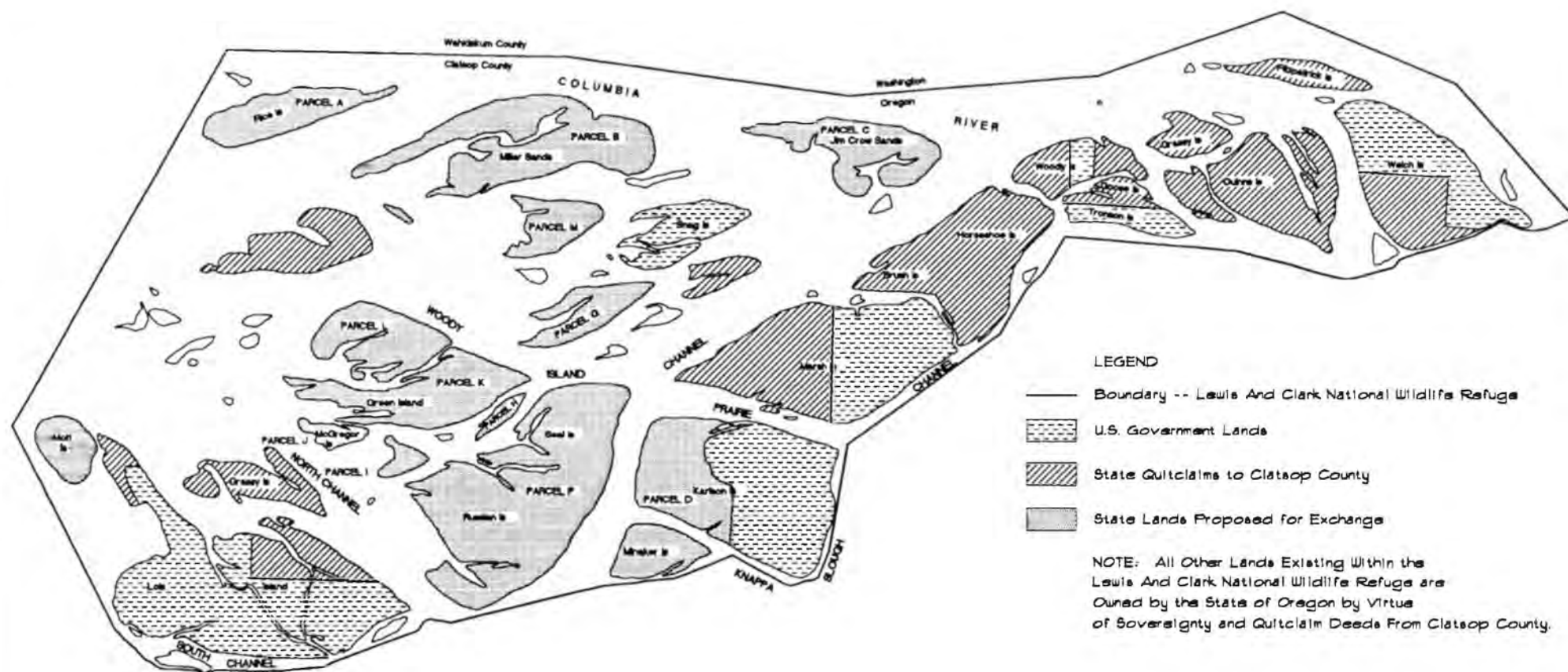


Figure 2-3  
**STATE-OWNED ISLANDS  
 PROPOSED FOR EXCHANGE**  
 SOUTH TONGUE POINT EIS  
 June 19, 1992

TABLE 2-4

**PRIORITY LIST OF POTENTIAL  
STATE-OWNED EXCHANGE LANDS WITHIN  
LEWIS AND CLARK NATIONAL WILDLIFE REFUGE**

---

| <u>Parcel Name</u>       | <u>Priority</u> |
|--------------------------|-----------------|
| Miller Sands Island/Spit | 1               |
| Karlson Island           | 2               |
| Rice Island              | 3               |
| Jim Crow Sands           | 4               |
| Russian/Seal Islands     | 5               |
| Green Island             | 6               |
| Parcel G                 | 7               |
| Mott Island              | 8               |
| Parcel M                 | 9               |
| Minaker Island           | 10              |
| McGregor Island/Parcel J | 11              |
| Parcel H                 | 12              |
| Parcel I                 | 13              |
| Parcel L                 | 14              |

---

Impacts associated with Alternative A are presented in Chapter 4.0 -- Environmental Consequences.

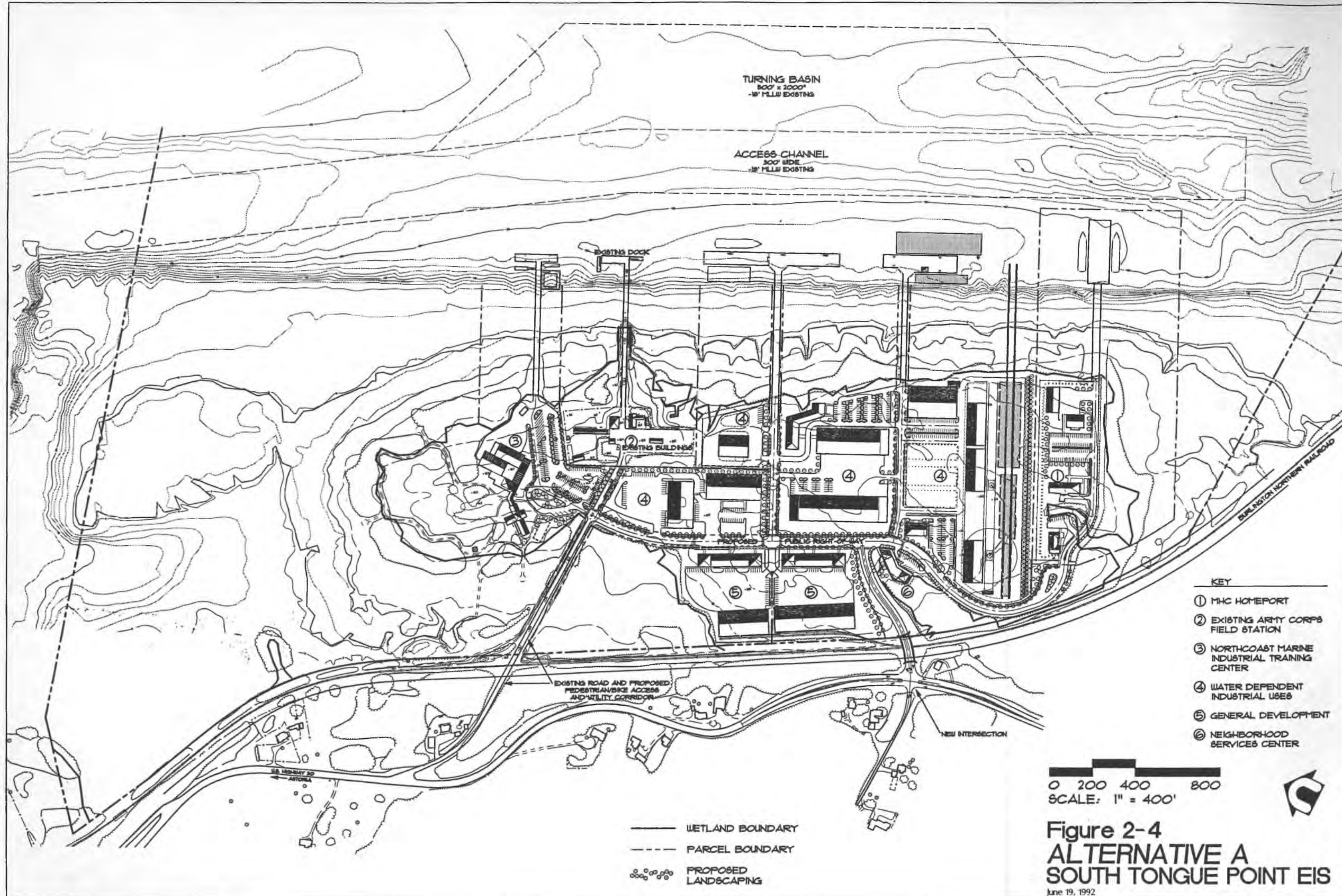
**A. Phase 1**

Site Infrastructure

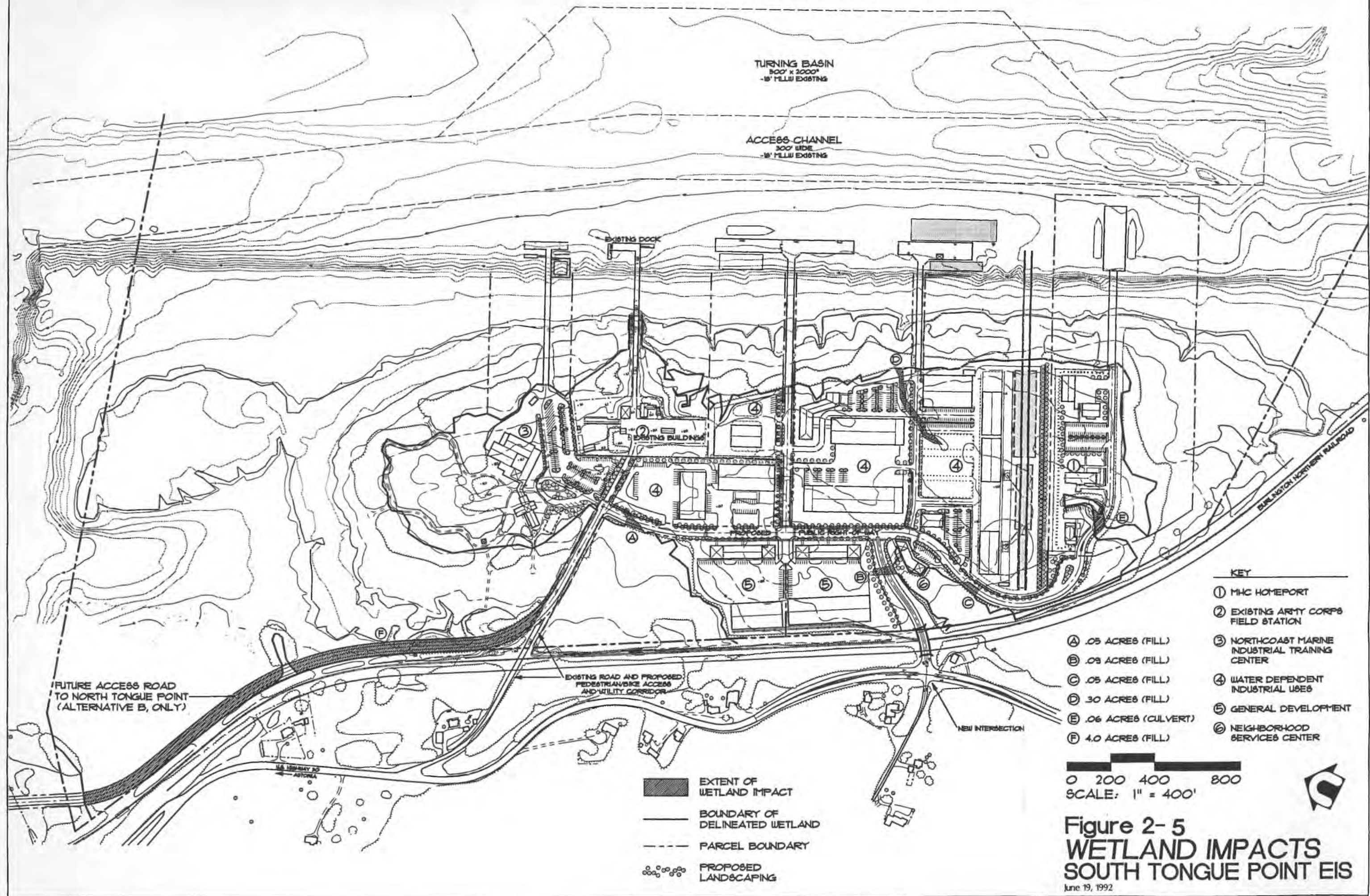
Alternative A would include construction of the following basic site infrastructure to serve the existing and proposed development at South Tongue Point.

- A new intersection on U.S. Highway 30 with turn lanes and a new access road to the central part of the site. The access road would include an overpass over the existing railroad tracks, for a grade-separated crossing. The access road would be 44 feet wide and 700 feet long. The roadway width would provide two travel lanes, shoulders, and a left-turn lane at intersection approaches.









- An on-site local service road to provide access to individual parcels would be 36 feet wide and 2,700 feet long. The roadway width would provide two travel lanes and shoulders.
- A 12-inch diameter water main would be extended from the City of Astoria system along U.S. Highway 30, entering the site along the existing access road embankment and distributed along the on-site local service road to serve all parcels. The water main would also be extended south to connect with the City's 24-inch-diameter supply conduit west of the John Day community. This would provide a looped water supply which is needed for adequate fire flow rates.
- Sanitary sewer service would be provided to serve all parcels on-site. Gravity sewer mains in the local service road would drain to a new pump station with discharge through a force main leaving the site along the existing access road and following U.S. Highway 30 to connect to the trunk sewer near the City of Astoria sewage treatment plant.
- Electric, telephone, cable, and natural gas utility distribution lines would be located along the on-site local service road.
- Street lighting would be provided at the new U.S. Highway 30 intersection, along the new access road, and on-site local service road.
- Wetland fill would be required for the access road and local service road at three locations, and additional fill to create a uniform upland boundary, with a cumulative total of approximately 0.57 acres. Mitigation of wetland impacts would be provided in upland areas on-site.

#### Development Uses

Six development areas are proposed for the site including the existing Corps Field Station. Development areas total about 65 acres including natural vegetation areas to be retained and buffer areas.

**U.S. Navy:** At the south end of the site a new facility is proposed for the Navy for berthing two minehunter coastal craft. The minehunter coastal craft perform in the coastal waters of the United States. The mine hunting operation supports battlefleet groups as they enter and exit ports of the United States, as well as maintain safe and secure harbors and coastal areas for domestic commercial marine traffic. The minehunter coastal craft is not designed for overseas deployment, nor for extended at-sea assignments far from the homeport. The homeport facility at South Tongue Point would provide the Navy with regional mine hunting capability throughout the Pacific Northwest. The minehunter coastal craft are specifically designed to operate as quietly as possible. The majority of the minehunter coastal craft work program consists of



hydrographic surveying of the river, bay, and ocean floor areas. The typical work routine is similar to the hydrographic survey vessels berthed by the Corps at the Astoria Field Station at South Tongue Point. Hull vibration is minimal. Typical propeller wash is non-existent due to state-of-the-art design technology. Above-water noise level is less than a commercial tugboat. Below water noise is less than a recreational cabin cruiser. An electronically powered remote operating vehicle is tethered to the vessel and is deployed during work programs. No other overboard devices or materials are utilized in the vessel operations. If mines are located, the vessel does not perform mine destruction. No detonation or explosive charges are carried on board the vessel or stored on-site. A sewage pump-out station would be provided on the pier.

The naval facility would include a pile-supported berthing pier and access trestle, warehouse, shop, administration building, barracks, staging area, and parking lot. A wetland fill of about 0.08 acres would be required for the access drive within the naval facility. The upland area of the Navy facility site is approximately 7.2 acres. Approximately 5.8 acres are planned for development with the rest of the area to remain in a natural condition.

Water access to the proposed berthing pier would be provided by the existing access channel. A recent hydrographic survey has confirmed existing water depth in the channel to be -22 to -35 feet mean sea level (or 19 to 32 feet MLLW). This depth is adequate for the Navy vessels; therefore, no dredging is required for initial project development.

**Other Water-Dependent Uses:** The area east of the local service road, between the Corps Field Station and the Navy site is proposed for development of multiple water-dependent uses. These operations would not require initial dredging. Typical water-dependent uses include:

- A barge construction facility with a pile-supported launchway and fitting pier, material storage, fabrication shop, assembly area, administration building and parking lot.
- A berthing facility for an oil spill recovery vessel and other moderate-draft vessels with a pile-supported berthing pier and access trestle, storage buildings, staging areas, and parking lots.

The upland area of the water-dependent development site is approximately 31.1 acres. Approximately 29 acres are planned for development. A wetland fill of approximately 0.30 acres is proposed for a drainage swale that crosses a portion of the water-dependent development area.

**Corps Field Station:** The existing Corps Field Station includes an administration building, shop, six storage buildings, a pile-supported berthing pier for hydrographic survey vessels, pile-supported access trestle, roadway embankment, outdoor storage areas, and parking lot. Existing activities at the Corps facility would continue. The upland area of the Corps site is approximately 6.4 acres. Approximately 5 acres are developed.



The Federal land surplus process currently underway for South Tongue Point would leave the Corps with approximately 30 acres of land and water area. The Corps has also initiated a subsequent surplus action that would make an additional 17 acres available at South Tongue Point. This additional surplus land area has been incorporated into the master plan for development.

**Community College:** The area north of the Corps facility is proposed for development of a satellite campus for Clatsop Community College. The campus would include buildings for the marine education program (including fishing technology and boat repair), welding technology program, and a new environmental education program (including natural interpretive training). This area would also include a pile-supported pier and access trestle for berthing the College's marine training vessel and a floating enclosed area for in-water training activities. Most of the northern end of the site is proposed to be left in a natural condition and include a nature trail system. The upland area of the College site is approximately 11.8 acres. Approximately 4 acres are planned for development.

**Non-Water-Dependent Uses:** The area west of the local service road and north of the new access road is proposed for development of non-water-dependent (general industrial) uses since there is no direct access to navigable water. Uses such as manufacturing, storage of marine cargos, general warehousing, and distribution are proposed for this area.

A small service center south of the new access road and west of the local service road would provide limited commercial operations (e.g., a convenience store, branch bank, and dry cleaner) on-site for tenant use. The service center is not intended to serve off-site commercial needs. The upland area of this non-water-dependent development site is approximately 0.5 acres. Approximately 0.4 acres are planned for development.

A railroad spur track is proposed to serve the non-water-dependent use area. The upland area of this non-water-dependent development site is approximately 8.9 acres. Approximately eight acres are planned for development.

## **B. Phase 2**

### Development Uses

No additional development areas or uses, or pile-supported structures are expected beyond the initial development described under Phase 1, above.

### Maintenance Dredging

Existing water depths are sufficient to accommodate moderate-draft vessels. During Phase 2, maintenance dredging may be required to keep the access channel and turning basin at the required 18 feet MLLW. Maintenance dredging would be needed only if the channel became

too shallow for passage by moderate draft vessels. At the present time, the channel is 19 to 32 feet MLLW. The shoaling rate of the channel is approximately 0.2 to 0.4 feet per year (Ogden Beeman & Associates, Inc., 1992). Given this shoaling rate, the earliest possible time that dredging may become necessary would be 6 years from the present (Ogden Beeman & Associates, Inc., 1992). Assuming this dredging interval and the maximum shoaling rate, a maximum of 177,000 cubic yards of sediments may need to be removed. This amount of dredging could take up to several weeks to complete. Dredging would take place only in those areas where sediment accumulation has reduced water depths to levels significantly shallower than 18 feet MLLW. Prior to any dredging, a hydrographic survey would be conducted in order to identify those areas where dredging is needed.

### **2.3.2 ALTERNATIVE B - DEVELOPMENT OF SOUTH TONGUE POINT WITH A ROAD CONNECTION TO NORTH TONGUE POINT**

Alternative B comprises the same two elements as Alternative A, the Service's Preferred Alternative: (1) the land exchange (Section 2.3.1.1 -- Land Exchange), and (2) the multi-tenant marine industrial development (Section 2.3.1.2 -- Multi-Tenant Marine Industrial Development). Phase 1 of Alternative B would be identical to that described for Alternative A. However, Phase 2 would include the construction of a road connection to North Tongue Point, as described below. The other aspects of Phase 2 (development uses and maintenance dredging) would be the same for Alternative B as for Alternative A (Figure 2-6).

Impacts associated with Alternative B are presented in Chapter 4.0 -- Environmental Consequences.

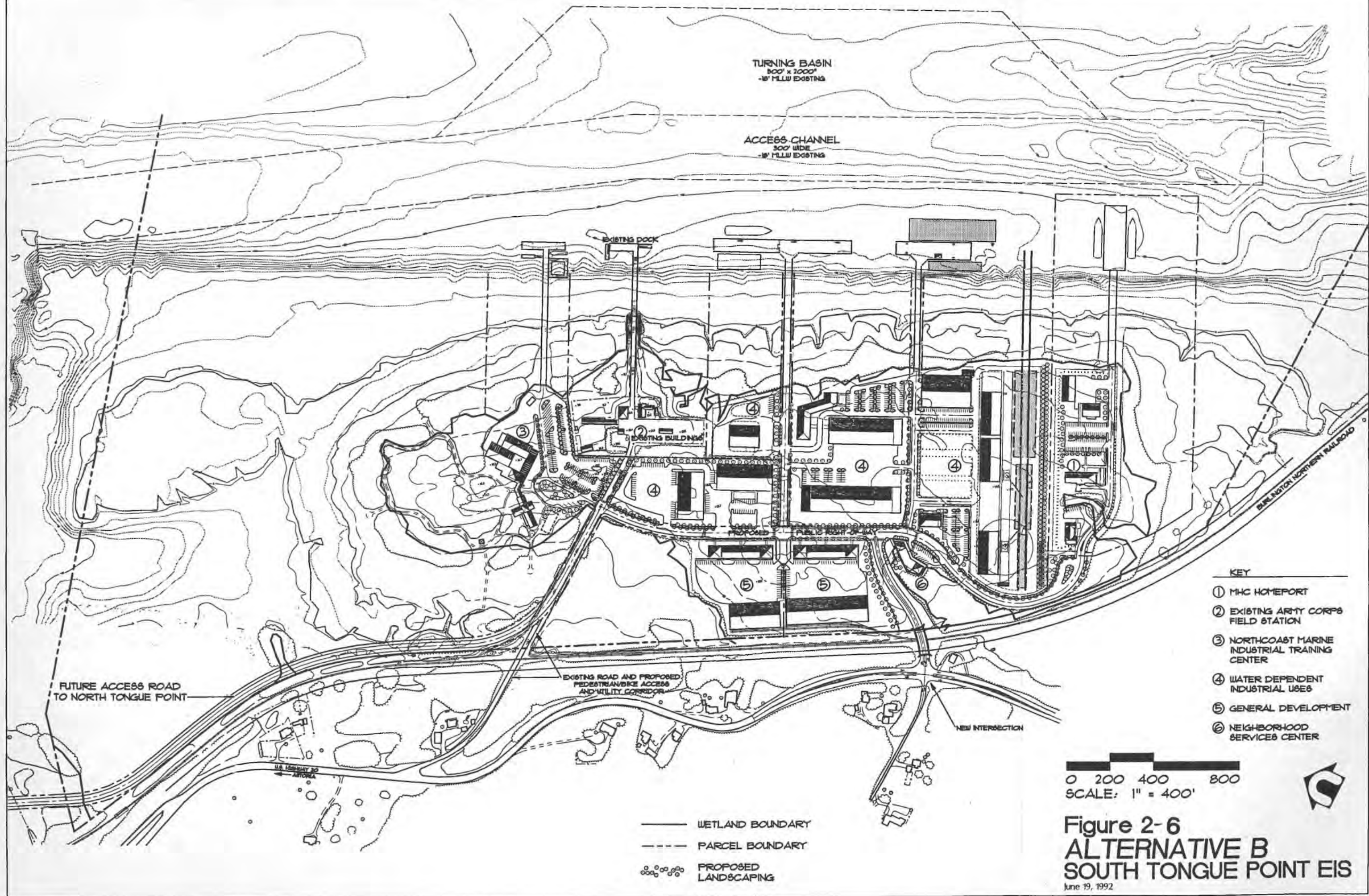
#### **A. Phase 2**

##### Site Infrastructure

A new access road would connect the South Tongue Point site with the water-dependent development area at North Tongue Point. The road would be located on fill adjacent to the existing railroad embankment extending from the existing South Tongue Point site access road to the filled upland area at North Tongue Point (Figure 2-5). The connecting road would be 36 feet wide and approximately 2,200 feet long. As part of the connecting road, the existing Corps' access road would be widened to 36 feet. This connecting road would require approximately 4 acres of wetland fill.

As noted above, the primary purpose of this road would be to provide a connection between the general development areas (i.e., parcels without water access) at South Tongue Point and marine cargo and other water-dependent activities proposed at North Tongue Point. The general development areas could provide upland areas to support activities at North Tongue Point.





The need for the new access road between North Tongue Point and South Tongue Point would be determined by the Division and the North Tongue Point tenant. As noted above, the tenant has a 23-year lease for North Tongue Point. Therefore, the earliest possible time frame for the new access road would be 1993 and the latest would be 2016.

### **2.3.3 ALTERNATIVE C - THE NO ACTION ALTERNATIVE**

With the No Action Alternative, South Tongue Point would remain in its current condition -- undeveloped, except for the existing Corps Field Station. There would be no land exchange. Therefore, South Tongue Point would remain in Federal ownership and the State-owned islands would remain within the administration boundary of the Refuge but would not be conveyed to the Service.

With the No Action Alternative, there would be no marine industrial development at South Tongue Point by the Division. Therefore, there would be no economic development benefits to the State of Oregon, City of Astoria, or Clatsop County. The Navy would develop a homeport facility at another site, but not within the State of Oregon, since there are not other appropriate sites available.

GSA could make South Tongue Point available to the general public, assuming other government agencies were not interested in the property. However, given the costs of extending infrastructure and improving transportation facilities, industrial development at South Tongue Point is considered to be extremely unlikely with the No Action Alternative.

Impacts associated with the No Action Alternative are presented in Chapter 4.0 -- Environmental Consequences.



## CHAPTER 3.0 AFFECTED ENVIRONMENT

### 3.1 SOUTH TONGUE POINT

This chapter discusses the important physical, biological, cultural, and social factors that describe South Tongue Point. The discussion focusses on those factors that may affect or be affected by a change of land use at South Tongue Point.

#### 3.1.1 PHYSICAL ENVIRONMENT

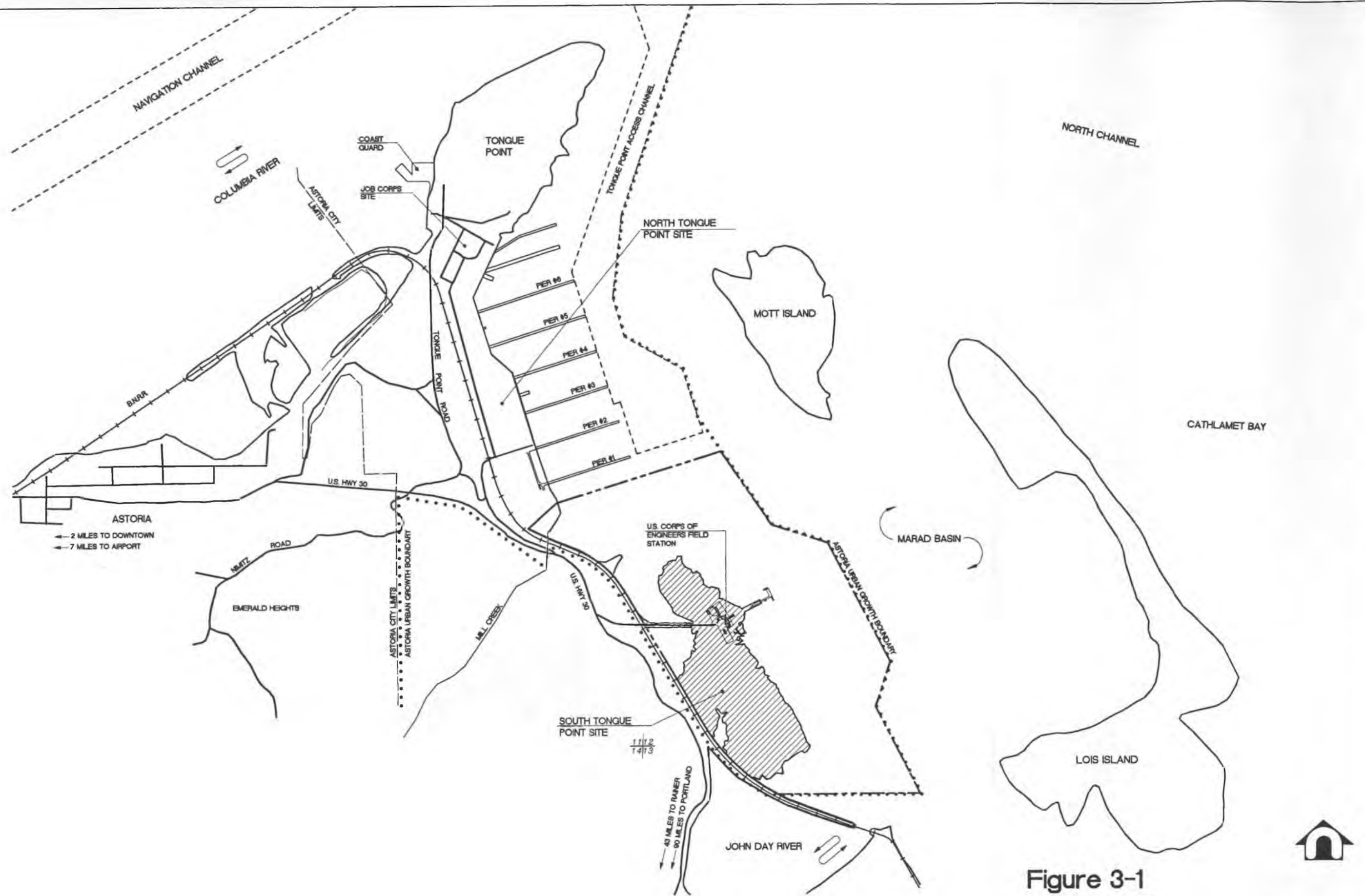
##### 3.1.1.1 Project Location and Vicinity Description

The project site, called South Tongue Point, is located at Tax Lot 100, Section 12, Township 8 North, Range 9 West, W.M., Clatsop County, Oregon. The site is located approximately one mile east of the City of Astoria and immediately north of the mouth of the John Day River, east of U.S. Highway 30, and south of the area called North Tongue Point. North Tongue Point includes the natural peninsula historically called Tongue Point, as well as an area immediately to the southeast of the peninsula that was created through the deposition of fill from dredging. The site is located at River Mile (RM) 18 on the Columbia River, within the Lower Columbia River Estuary, about two miles south of the main navigation channel (Figure 3-1).

The upland area at South Tongue Point was created with dredged materials in the 1950s. The open water area adjacent to South Tongue Point is usually referred to as the MARAD Basin or Mott Basin. The MARAD Basin is a portion of Cathlamet Bay which was deepened to provide adequate draft for a mooring basin for merchant ships that were stored at the site following World War II. Cathlamet Bay is in turn part of the Lower Columbia River Estuary, a complex of open water channels, tidal mudflats, and natural and manmade islands. Lois Island is directly east of the subject property and forms the eastern side of MARAD Basin. Mott Island is to the northeast of the subject property. Both of these islands were also created with dredged materials during the deepening of the MARAD Basin.

Landside access to South Tongue Point is provided from U.S. Highway 30 by an 18-foot-wide paved access road. The Burlington Northern Railroad line provides the western boundary to South Tongue Point, but does not currently have a rail siding to the interior of the subject property.

The upland area at South Tongue Point is owned by the Federal government and comprises approximately 73 acres. The remainder of the approximately 330-acre site is wetlands, intertidal mudflats, and subtidal areas. Ownership of the non-upland area is divided between the Federal government and the State of Oregon. The majority of the upland portion of the site is administered by GSA, but is managed by the Corps.



**Figure 3-1**  
**SITE AND**  
**SURROUNDING AREA**  
**SOUTH TONGUE POINT EIS**  
 June 19, 1992

The Corps manages approximately 30 acres of upland and intertidal area on South Tongue Point. The Corps uses approximately six upland acres of this 30-acre area for a hydrographic survey field station, known as the Corps Astoria Field Station. The Corps Astoria Field Station includes a wooden pier for mooring the station's survey boats, as well as an administration building, maintenance area, and paved parking lot.

### **3.1.1.2      Climate and Weather**

The climate of the project area is marine temperate, characterized by mild rainy winters and cool summers. Temperatures seldom rise over 85° F. The average annual rainfall ranges from 80 to 120 inches, with most of the rain occurring between November and February. Fog is frequent in the summer months.

At South Tongue Point, the prevailing winter winds come from the south and southwest. The subject property is well protected from these winds. It is the winds from the north and northeast, across the Columbia River, typically generated by severe winter storms, that find South Tongue Point unprotected. During these storms, the MARAD Basin becomes choppy and there may be ice build-up on floats and docks which can damage boats and other equipment. According to a representative of the Corps Astoria Field Station, these events may be expected approximately once per year and are typically of short duration (less than one week).

Information provided by the National Oceanic and Atmospheric Administration for 1984 shows an average annual wind speed of 8.5 miles per hour (mph) at Astoria. For this same year, the highest average wind speeds were recorded in December at 9.2 mph from the southeast. The lowest wind speeds were recorded in September and October at 7.5 mph, also from the southeast. The period from April through August is characterized by winds from the northwest.

In 1984, there were 49.6 sunny (cloudless) days in Astoria. September had the most sunny days (8.4), while December had the least (2.3).

The record high and low temperatures were 100° F in July 1961 and 6° F in December 1972, respectively. The average high temperature for 1984 was 58.2° F, with a range from 47.4 to 67.8° F. The average low temperature for the same period was 43.3° F, with a range from 35.8 to 52.6° F.

### **3.1.1.3      Topography and Site Description**

#### **A.      Upland Topography and Site Description**

Prior to 1949, the area between the mouth of the John Day River and North Tongue Point was an area of shallow waters, tidal flats, and marshes. The existing Burlington Northern Railroad track marked the approximate shoreline east of the neck of North Tongue Point, except on the west side of the John Day River mouth, where the fill for the railroad track cut off a shallow



embayment. The present Mott and Lois islands were tide lands or water up to 15 feet deep MLLW. Between March 1949 and November 1951, the MARAD Basin was dredged to about 20 feet MLLW and substantial fill was placed at the South Tongue Point site. Between February and July 1954 the basin was deepened to over -30 feet MLLW and additional fill was placed at the South Tongue Point site, creating the upland and modified intertidal area existing today as South Tongue Point. Mott and Lois islands were also enlarged with this material.

South Tongue Point is relatively flat. Spot elevations along the perimeter of the upland areas range from 5.6 to 12.8 feet NGVD (National Geodetic Vertical Datum). According to a topographical survey prepared by Spencer B. Gross, Inc. (1991), the high point on the subject property is approximately 18 feet NGVD (or 21 feet MLLW) and is located southwest of the Corps Astoria Field Station. The elevation at the Corps Astoria Field Station is approximately 13 feet NGVD (or 16 feet MLLW). The access road to the Corps Astoria Field Station is approximately 13 feet NGVD (or 16 feet MLLW). The Burlington Northern Railroad line along the western perimeter of the subject property is approximately 12 feet NGVD (or 15 feet MLLW) (Figure 3-2).

The upland at South Tongue Point is densely vegetated with deciduous species of trees and shrubs, with a scattering of evergreens. The central portion of the site is nearly surrounded by a band of intertidal marshes and wetlands.

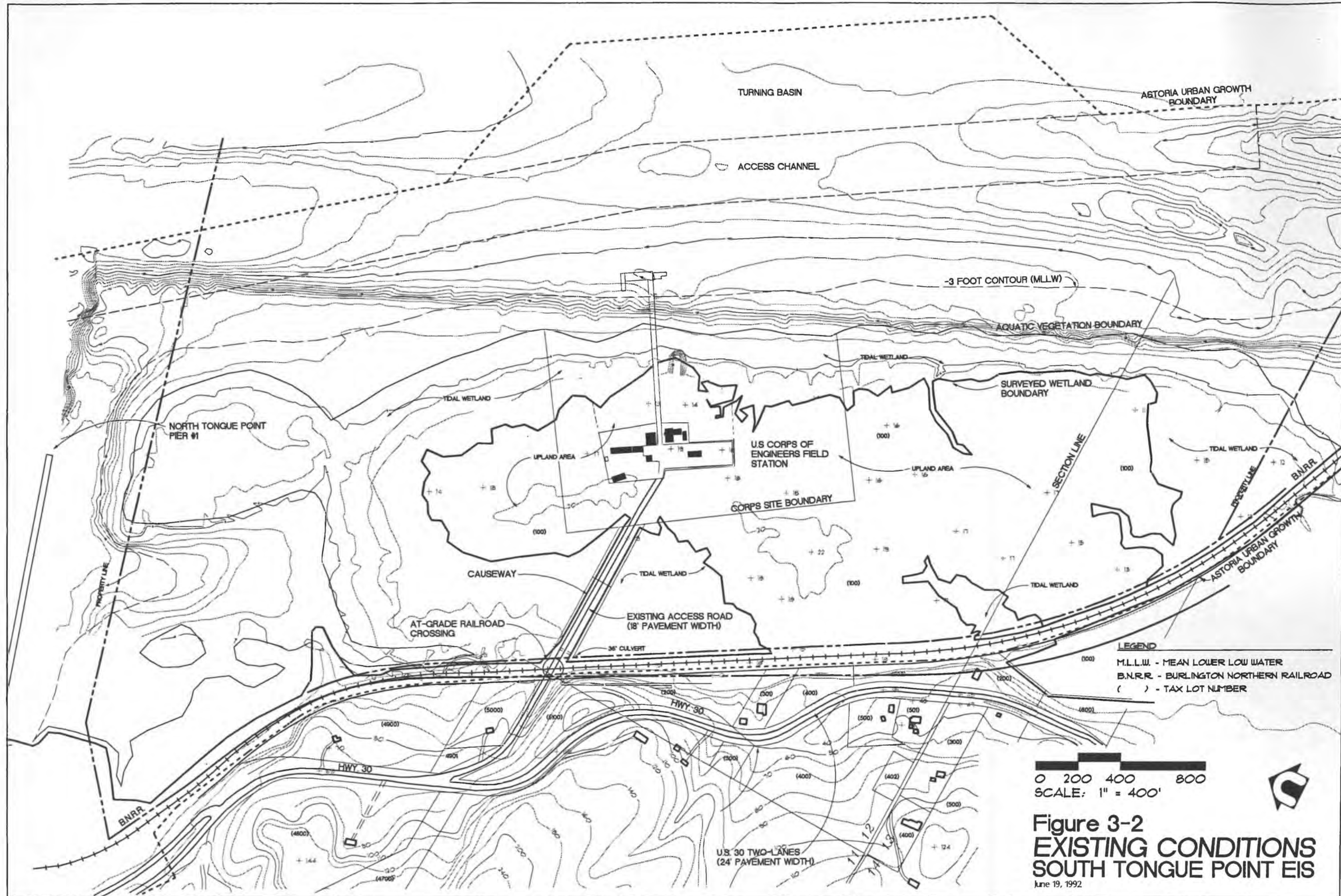
## **B. Aquatic Topography and Site Description**

South Tongue Point is located within the Lower Columbia River Estuary. The Estuary has areas of regular salt water mixing; however, salt intrusions are largely limited to the main channel where the water is deeper and the tidal current stronger. The area where South Tongue Point is located has very low salinity.

The partially enclosed aquatic area east of South Tongue Point, known as the MARAD Basin, is characterized by slower currents and finer sediments than the main river channel. The bathymetric contours of much of the aquatic topography were modified in the process of creating the MARAD Basin. The Federally authorized navigation channel into Cathlamet Bay ranges from approximately 40 feet MLLW at the mouth to approximately 25 feet MLLW east of the finger piers of North Tongue Point. The deepest water immediately off the shore of South Tongue Point varies from 19 to 32 feet MLLW. Shoaling rates in this deep water channel average 0.2 to 0.4 feet per year (Ogden Beeman & Associates, Inc., 1992).

A band of intertidal areas, including tidal flats and marshes surrounds the uplands. This intertidal area varies from approximately 300 feet to 1,500 feet wide, and averages approximately 500 feet in width. Currents and flushing in the waters east of South Tongue Point result primarily from tidal flow and are highly variable. This variability is due primarily to tidal cycles, upland discharge, and saltwater intrusion (Enviro Science, Inc., 1983).





The aquatic area surrounding South Tongue Point is subject to a mean and diurnal tidal range of 6.5 and 8.2 feet MLLW (Columbia River Estuary Taskforce, 1979), with a maximum range of 13 feet.

#### **3.1.1.4      Soils, Geology, Sediments, and Geologic Hazards**

##### **A.      Soils**

According to the Soil Survey of Clatsop County, Oregon, prepared by the United States Department of Agriculture Soil Conservation Service (1988), South Tongue Point includes the following two soil types (Figure 3-3):

##### **Tropopsamments, 0 to 15 Percent Slopes**

Tropopsamments soils comprise the upland area, or approximately 73 acres on South Tongue Point. These soils are located along the Columbia River and are formed in stratified dredge spoils. Tropopsamments account for 0.2 percent of the soil types in Clatsop County. This soil type has a Land Capability Class of VIe.

##### **Coquille/Clatsop Complex, 0 to 1 Percent Slopes**

The Coquille/Clatsop complex characterizes the wetland area, or approximately 79 acres on South Tongue Point. These soils, which are very deep and very poorly drained are influenced by tides. They are formed by alluvium. The Coquille/Clatsop complex accounts for 1.4 percent of the soil types in Clatsop County. This soil type has a Land Capability Class of VIe. The depth to the water table for this soil class ranges from 24 inches above the surface to 24 inches below the surface throughout the year. The Coquille/Clatsop soil type is listed as a hydric (wetland) soil by the Soils Conservation Service (1989).

The area to the west of the railroad track, which was not created by dredge fill, is characterized by the following soil types: (1) Grindbrook silt loam, bedrock substratum, 3 to 30 percent slopes; (2) Templeton silt loam, 3 to 30 percent slopes; (3) Templeton-Ecola silt loam, 30 to 60 percent slopes; (4) Walluski silt loam, 7 to 15 percent slopes; and (5) Walluski silt loam, 15 to 20 percent slopes. Collectively, these soil types are characteristic of the relatively steep and forested area to the west of the subject property. These soil types are typically found on mountaintops, mountainsides, and terraces. The soils are moderately well to well drained. The Land Capability Classes of these soils range from IIIe to VIe.

##### **B.      Geology**

A geotechnical investigation conducted for the south-central portion of South Tongue Point (Geotechnical Resources, Inc., 1991), found that the upland portion of the site is mantled with dredged materials placed 40 to 50 years ago. The dredge materials are predominantly sand, with





varying amounts of silt, and constitute a layer approximately 10 to 25 feet thick. Below the fill in the upland portions of the site and below the mudline in the intertidal and water portions of the site, the soil consists of flood plain deposits of the Columbia River. These deposits typically consist of sands and silts which are underlain by sandstone and siltstone. A layer of hard ash was located in two of the test borings.

### C. Sediments

Cathlamet Bay is an area of long-term accumulation of fine sediments. Sedimentation rates are slow. In the navigation channel along the east side of South Tongue Point, where the depths are presently 19 to 30 feet MLLW, sedimentation rates are approximately 0.2 to 0.4 feet per year (Ogden Beeman & Associates, Inc., 1992). Sedimentation has occurred at a faster rate around the piers at North Tongue Point and in the channel leading to the navigation channel. Sediments in the MARAD basin are 80 to 95 percent very fine sand, silts, and clays (Ingels, 1989).

Sediment texture in Cathlamet Bay is generally finer than that of the sandy substrates prevalent in adjacent areas of the main Columbia River channel (Sherwood et al., 1984). Subtidal sediments in western Cathlamet Bay near the project site have variable texture and consist predominantly of very fine sands and silts with some clay (Hubbell and Glen, 1973; Higley and Holton, 1978; Durkin and Emmett, 1980; Emmett et al., 1986). The organic content of subtidal sediments near South Tongue Point can be as high as 5 to 7 percent (Durkin and Emmett, 1980; Emmett et al., 1986). Based upon a cursory field examination, it appears that sediment texture within intertidal areas at South Tongue Point may be slightly coarser than that reported for adjacent subtidal areas.

Sediment composition affects the composition of benthic invertebrate communities within the estuary and indirectly affects the fish or other animals that feed upon them. Stable, finer textured sediments within the estuary tend to provide more hospitable environments for most benthic invertebrates than coarse sediments which are less stable.

The concern was raised during the Scoping process that sediments in the vicinity of South Tongue Point could be contaminated with materials potentially hazardous to living organisms. The likelihood of contaminated sediments within 4 feet of the biotic zone is low, as discussed in Section 3.1.1.9.B (Sediment Hazardous Materials).

### D. Geologic Hazards

#### Erosion

The Tropopsamments soils found in the upland area have a moderate hazard of erosion by wind if vegetation or other protective cover is removed. The Coquille/Clatsop complex found in the wetland areas has a moderate hazard of erosion by water.



Removal of vegetation for project construction could expose the project site to the erosive action of the wind and rain, impacting the wetlands through siltation and the surrounding water quality through increased turbidity. Standard erosion control procedures, such as temporary berms, will prevent the impacts of erosion from becoming significant.

### Seismic Activity

South Tongue Point is located in seismic zone 2B of the Uniform Building Code. Recent geologic and seismological evidence suggests that a previously unrecognized seismic hazard may exist in the project area and that the present zone assignment may underestimate that hazard (Geotechnical Resources, Inc., 1991). The geologic evidence available today indicates that great earthquakes have occurred in recent pre-historic times on the Cascadia Subduction Zone, and that past earthquakes have affected large areas of coastal Oregon and Washington. These great earthquakes appear to have occurred about every 600 years, with the best estimates indicating that the last great earthquake occurred 600 years ago. The risk of a great earthquake appears to be remote (Northwest Geological Services, 1990).

Other recent studies indicate that the most likely seismic risks in western Oregon over the next 100 years are from moderate-sized, shallow earthquakes in the North American plate, and moderately large events in the subducted Juan de Fuca plate. The most likely location for a large, deep earthquake appears to be beneath the eastern flank of the Coast Range, approximately 40 miles from South Tongue Point. The most likely location for a moderate, shallow earthquake appears to be in the Coast Range south and east of the site (Northwest Geological Services, 1990).

Based on surface conditions at the site and the results of recent seismic studies conducted for similar sites, it appears that there may be some risk of liquefaction on South Tongue Point during a major strong-motion seismic event (Geotechnical Resources, Inc. 1991). The estimated frequency for a great earthquake is approximately every 300 years.

According to the Oregon Department of Geology and Mineral Industries (1972), there is a fault running along the southwest-northeast axis which passes across the Mill Creek mudflats. This fault is not considered to be active.

### Other Geologic Hazards

Other than earthquakes, discussed above, coastal sites may be vulnerable to such geologic hazards as subsidence, tsunamis, and a global rise in sea level resulting from global warming.

**Tsunamis:** The Corps has assessed the 100-year and 500-year tsunami hazards from distant, great earthquakes such as those in very seismically active areas around the Pacific. These possible events would be of less magnitude than the 100-year storm surge predicted by the Federal Emergency Management Agency and shown on the Flood Insurance Rate Map as the

100-year flood plain at 9.2 feet NGVD. It is possible that a tsunami resulting from a great earthquake on the Cascadia Subduction Zone could produce a tsunami greater than the predicted 100-year storm surge. However, the risk of such large tsunamis in the local geologic record is approximately half of that for a great earthquake (Northwest Geological Services, 1990).

**Subsidence and Global Warming:** Deposits in coastal marshes provide a geologic record of subsidence during prehistoric great earthquakes. Approximately three feet of sudden subsidence is estimated to have occurred in some areas of the Oregon coastline during the last two great earthquakes. The frequency of these subsidence events is the same as the great earthquakes that cause them -- approximately every 600 years (Northwest Geological Services, 1990).

Different models predict a rise in the world-wide sea level of a few inches to three feet over the next 100 years (Northwest Geological Services, 1990). It is not probable that either co-seismic subsidence or a global rise in sea level will pose a significant risk to South Tongue Point. While subsidence or a rise in sea level will have the detrimental effect of increasing the risk of flooding by extreme events, this increased risk appears to be small in relation to the relatively well-defined risks from storm surge, moderate earthquakes, or distant tsunamis.

#### **3.1.1.5      Hydraulics and Hydrology**

##### **A.      Hydrology**

Aquatic habitat at South Tongue Point and other locations within the Lower Columbia River Estuary is influenced by the interaction of tidal cycles and freshwater discharge. This interaction effects changes in water level, water currents, freshwater-saltwater mixing patterns and salinity intrusion.

Salinity intrusion is particularly important because it can have a dramatic effect upon the distribution of estuarine organisms. Intruding saline water moves upstream under less dense Columbia River discharge as far as RM 26.5 in the main navigation channel and RM 21 in the North and Prairie channels of Cathlamet Bay (McConnell et al., 1979). The distance saline water intrudes upriver is greatest in deep channels at high tide during periods of lowest flow. As flows in the Columbia River increase or as tidal stage decreases, the extent of salinity intrusion is decreased. McConnell et al. (1979) noted that a historic trend toward greater salinity intrusion up the river may be related to dredging activities which have deepened the Columbia River bar and navigation channel. Seaman (1977) also suggested that the trend might be associated with increased flow regulation at upstream reservoirs and decreased river discharge over recent years.

Recent studies of the Columbia River Estuary have led to the identification of three major hydrologic seasons (Simenstad et al., 1984): (1) spring high flow (April to June); (2) summer low flow (July to October); and (3) winter fluctuating flow (November to March). Spring is a period of consistently high river flow when salinity intrusion up the Columbia River is generally

at its minimum. Columbia River flows are consistently low during the summer, allowing maximum salinity intrusion. Freshwater discharge into the estuary during winter is high and variable relative to that during summer, but is typically much lower than that during spring.

Jay (1984) has modeled circulatory processes in the Columbia River Estuary. He found it difficult to predict salinity intrusion into Cathlamet Bay because the bay is adjacent to the main Columbia River channel near the upstream limits of salinity intrusion. Jay (1984) also noted that wind-driven circulatory processes were important in Cathlamet Bay. He observed that the bay is a shallow depositional area that lacks both the strong tidal energy of lower portions of the estuary and the fluvial energy of sites farther upriver.

The average annual discharges for the Columbia River mouth at Astoria has been computed by the U.S. Geological Survey to be 265,000 cubic feet per second (U.S. Geological Survey, 1987). Measurements of the hydrological conditions of Mill Creek and the John Day River have not been made (Miller, pers. comm., December 30, 1991; Scale, pers. comm., December 30, 1991); therefore, their relative hydrologic contributions to the Tongue Point embayment cannot be assessed. However, some generalizations can be made. The John Day River is a moderately sized, perennial, low-gradient waterway draining an area of approximately 6.73 square miles, which enters the Lower Columbia River Estuary between John Day Point and South Tongue Point. The John Day River is under tidal influence for most of its length. Depending on tidal movement and saltwater intrusion, the net freshwater discharge of the John Day River is probably low or insignificant during most of the year. Mill Creek is a small perennial stream draining an area of approximately 1.7 square miles which enters the Lower Columbia River Estuary just north of South Tongue Point. Like the John Day River, the net freshwater discharge of Mill Creek is probably low or insignificant (Enviro Science, Inc., 1983).

## **B. Surface Water Quality**

This section discusses water quality in the vicinity of the proposed marine industrial park on South Tongue Point. Available data characterizing water quality data in the lower portion of the Columbia River in the vicinity of Tongue Point, particularly North and South Tongue Point, MARAD Basin, and Cathlamet Bay, is summarized and the compliance of these data with Oregon State Water Quality Criteria is evaluated.

As discussed above (Section 3.1.1.5.A -- Hydrology), water circulation in the portion of the Columbia River adjacent to South Tongue Point is estuarine in character. River flow varies both diurnally and seasonally in response to tidal influences, precipitation, tributary discharge, and management of hydroelectric facilities upriver. Freshwater influences dominate in the vicinity of Tongue Point during most seasons (Simenstad et al., 1990).

There are few recent published reports on water quality in the vicinity of Tongue Point. The data that do exist are generally from the early 1980s and provide information primarily on conventional parameters such as salinity, temperature, pH, and turbidity. Little information is



available on chemical contaminants in river water. The few water quality studies that have been conducted in the vicinity of Tongue Point have been of limited duration and represent "snapshots" of varied water quality parameters at a given instant in time. No detailed long-term assessments exist for water quality in the vicinity of Tongue Point. Studies that have reported original data on water quality parameters in the vicinity of Tongue Point are discussed below.

Fuhrer and Rinella (1983) report data obtained during a joint study conducted by the U.S. Geological Survey and the Corps that examined the concentrations of chemicals in waters and elutriates in the Columbia River. The purpose of this study was to examine the effects of dredging on concentrations of contaminants in the overlying native water. Two water samples were collected in the vicinity of Tongue Point during this study. The first water sample was collected at Tongue Point (RM 18) on July 24, 1980. This sample was analyzed for dissolved concentrations of 11 trace metals, cyanide, organic carbon, ammonia nitrogen, ammonia nitrogen plus organic nitrogen, phosphorus, orthophosphate phosphorus, phenols, pH, specific conductance, 27 pesticides, and PCBs, using analytic methods approved by the U.S. Geological Survey and the Corps. Results of the chemical analyses on this sample, and compliance with current Oregon State water quality standards (Oregon Department of Environmental Quality, 1990), are summarized in Table 3-1. The pH of this water sample was 7.9, and the specific conductance was 1650  $\mu\text{mhos/cm}$ . Trace metals detected in this sample included copper, iron, lead, manganese, arsenic, and nickel. The concentrations of copper, arsenic, and nickel reported for this water sample would exceed current Oregon State water quality standards. Cadmium, chromium, mercury, zinc, barium, and cyanide were not detected at the method detection limits. With the exception of mercury and arsenic, detection limits were below State water quality standards. No pesticides or PCBs were detected in this sample. Total phenols were present at a concentration of 3  $\mu\text{g/L}$ . Nutrient concentrations were all below State water quality standards. Ammonia nitrogen was below detection ( $< 0.01 \mu\text{g/L}$ ); however, the concentration of ammonia plus organic nitrogen was 0.4  $\mu\text{mg/L}$ . The orthophosphate concentration was 36  $\mu\text{g/L}$  for this sample, and the total phosphorus concentration was 37  $\mu\text{g/L}$ .

Fuhrer and Rinella (1983) also provide data for a water sample collected on July 25, 1980, approximately eight miles downstream from Tongue Point, at Tansy Point (RM 10). Results of the chemical analyses on this sample, and compliance with current Oregon State water quality standards, are also summarized in Table 3-1. Water quality data for this sample are for the most part similar to that found at RM 18. The pH was 7.8. Specific conductance for this sample was higher (7850  $\mu\text{mhos/cm}$ ), most likely due to higher salinity farther downriver in the estuary. Trace metal concentrations were present at low levels. Copper concentration was lower in this water sample than for RM 18 and would not exceed State water quality criteria. No pesticides or PCBs were detected in this water sample. Phenol concentrations were higher than at RM 18 (8  $\mu\text{g/L}$ ), although still below State Water Quality standards. Nutrient concentrations (organic nitrogen and total phosphorus) were higher than those measured at Tongue Point.



TABLE 3-1

**DISSOLVED CHEMICAL CONCENTRATIONS MEASURED IN THE COLUMBIA RIVER  
NEAR TONGUE POINT AND TANSY POINT IN JULY 1980,  
AND COMPLIANCE WITH OREGON STATE WATER QUALITY CRITERIA**

| Chemical Parameter                      | Tongue Point<br>River Mile 18 | Compliance with<br>State Water<br>Quality Criteria | Tansy Point<br>River Mile 10 | Compliance with<br>State Water<br>Quality Criteria |
|-----------------------------------------|-------------------------------|----------------------------------------------------|------------------------------|----------------------------------------------------|
| pH                                      | 7.9                           | Yes                                                | 7.8                          | Yes                                                |
| Conductance ( $\mu$ mhos/cm)            | 1,650                         | Yes*                                               | 7,850                        | Yes*                                               |
| Cadmium ( $\mu$ g/L)                    | 0.04                          | Yes                                                | <1.0                         | Yes                                                |
| Chromium ( $\mu$ g/L)                   | <1.0                          | Yes                                                | <1.0                         | Yes                                                |
| Copper ( $\mu$ g/L)                     | 3.0                           | No <sup>b,d</sup>                                  | 2.0                          | Yes                                                |
| Iron ( $\mu$ g/L)                       | 20                            | Yes                                                | 30                           | Yes                                                |
| Lead ( $\mu$ g/L)                       | 2                             | Yes                                                | 1                            | Yes                                                |
| Manganese ( $\mu$ g/L)                  | 10                            | Yes                                                | 20                           | Yes                                                |
| Mercury ( $\mu$ g/L)                    | <0.1                          | No <sup>c,d</sup>                                  | <0.1                         | No <sup>c,d</sup>                                  |
| Zinc ( $\mu$ g/L)                       | <10                           | Yes                                                | 20                           | Yes                                                |
| Arsenic ( $\mu$ g/L)                    | 1                             | No <sup>e,f</sup>                                  | 1                            | No <sup>e,f</sup>                                  |
| Barium ( $\mu$ g/L)                     | <100                          | Yes                                                | <100                         | Yes                                                |
| Beryllium ( $\mu$ g/L)                  | ---                           |                                                    | 10                           | No <sup>d,e,f</sup>                                |
| Nickel ( $\mu$ g/L)                     | 4                             | No <sup>f</sup>                                    | <1                           | No <sup>f</sup>                                    |
| Cyanide ( $\mu$ g/L)                    | 0                             | **g                                                | 0                            | **g                                                |
| Carbon, Organic (mg/L)                  | 3.4                           | Yes*                                               | 2.7                          | Yes*                                               |
| Nitrogen, Ammonia ( $\mu$ g/L)          | <0.01                         | Yes                                                | <0.01                        | Yes                                                |
| Nitrogen, Ammonia plus organic (mg/L)   | 0.4                           | Yes*                                               | 1.6                          | Yes*                                               |
| Phosphorus, Orthophosphate ( $\mu$ g/L) | 36                            | Yes*                                               | 30                           | Yes*                                               |
| Phosphorus, Total ( $\mu$ g/L)          | 37                            | Yes*                                               | 58                           | Yes*                                               |
| Phenols ( $\mu$ g/L)                    | 3                             | Yes                                                | 8                            | Yes                                                |

TABLE 3-1, cont'd.

**DISSOLVED CHEMICAL CONCENTRATIONS MEASURED IN THE COLUMBIA RIVER  
NEAR TONGUE POINT AND TANSY POINT IN JULY 1980,  
AND COMPLIANCE WITH OREGON STATE WATER QUALITY CRITERIA**

| Chemical Parameter                                                                | Tongue Point<br>River Mile 18 | Compliance with<br>State Water<br>Quality Criteria | Tansy Point<br>River Mile 10 | Compliance with<br>State Water<br>Quality Criteria |
|-----------------------------------------------------------------------------------|-------------------------------|----------------------------------------------------|------------------------------|----------------------------------------------------|
| <b>Dissolved Insecticides and Herbicides (all in <math>\mu\text{g/L}</math>):</b> |                               |                                                    |                              |                                                    |
| Aldrin                                                                            | <0.01                         | No <sup>c,f</sup>                                  | <0.01                        | No <sup>c,f</sup>                                  |
| Ametryne                                                                          | <0.1                          | Yes*                                               | <0.1                         | Yes*                                               |
| Atraton                                                                           | <0.1                          | Yes*                                               | <0.1                         | Yes*                                               |
| Atrazine                                                                          | <0.1                          | Yes*                                               | <0.1                         | Yes*                                               |
| Chlordane                                                                         | <0.1                          | No <sup>b,c,d,e,f</sup>                            | <0.1                         | No <sup>b,c,d,e,f</sup>                            |
| Cyanazine                                                                         | <0.1                          | Yes*                                               | <0.1                         | Yes*                                               |
| Cyprazine                                                                         | <0.1                          | Yes*                                               | <0.1                         | Yes*                                               |
| DDD                                                                               | <0.01                         | Yes*                                               | <0.01                        | Yes*                                               |
| DDE                                                                               | <0.01                         | Yes                                                | <0.01                        | Yes                                                |
| DDT                                                                               | <0.01                         | No <sup>c,d,e,f</sup>                              | <0.01                        | No <sup>c,d,e,f</sup>                              |
| Dieldrin                                                                          | <0.01                         | No <sup>c,d,e,f</sup>                              | <0.01                        | No <sup>c,d,e,f</sup>                              |
| Endosulfan                                                                        | <0.01                         | No <sup>d</sup>                                    | <0.01                        | No <sup>d</sup>                                    |
| Endrin                                                                            | <0.01                         | No <sup>c,d</sup>                                  | <0.01                        | No <sup>c,d</sup>                                  |
| Heptachlor                                                                        | <0.01                         | No <sup>c,d,e,f</sup>                              | <0.01                        | No <sup>c,d,e,f</sup>                              |
| Heptachlor Epoxide                                                                | <0.01                         | Yes*                                               | <0.01                        | Yes*                                               |
| Lindane                                                                           | <0.01                         | Yes                                                | <0.01                        | Yes                                                |
| Methoxychlor                                                                      | <0.01                         | Yes                                                | <0.01                        | Yes                                                |
| Mirex                                                                             | <0.01                         | No <sup>c,d</sup>                                  | <0.01                        | No <sup>c,d</sup>                                  |
| PCB                                                                               | <0.1                          | No <sup>c,d,e,f</sup>                              | <0.1                         | No <sup>c,d,e,f</sup>                              |
| Naphthalenes, Polychlor                                                           | <0.1                          | Yes*                                               | <0.1                         | Yes*                                               |
| Perthane                                                                          | <0.1                          | Yes*                                               | <0.1                         | Yes*                                               |
| Prometone                                                                         | <0.1                          | Yes*                                               | <0.1                         | Yes*                                               |

TABLE 3-1, cont'd.

**DISSOLVED CHEMICAL CONCENTRATIONS MEASURED IN THE COLUMBIA RIVER  
NEAR TONGUE POINT AND TANSY POINT IN JULY 1980,  
AND COMPLIANCE WITH OREGON STATE WATER QUALITY CRITERIA**

| Chemical Parameter | Tongue Point<br>River Mile 18 | Compliance with<br>State Water<br>Quality Criteria | Tansy Point<br>River Mile 10 | Compliance with<br>State Water<br>Quality Criteria |
|--------------------|-------------------------------|----------------------------------------------------|------------------------------|----------------------------------------------------|
| Prometryne         | <0.1                          | Yes <sup>a</sup>                                   | <0.1                         | Yes <sup>a</sup>                                   |
| Propazine          | <0.1                          | Yes <sup>a</sup>                                   | <0.1                         | Yes <sup>a</sup>                                   |
| Simazine           | <0.1                          | Yes <sup>a</sup>                                   | <0.1                         | Yes <sup>a</sup>                                   |
| Simetone           | <0.01                         | Yes <sup>a</sup>                                   | <0.01                        | Yes <sup>a</sup>                                   |
| Simetryne          | <0.1                          | Yes <sup>a</sup>                                   | <0.1                         | Yes <sup>a</sup>                                   |
| Toxaphene          | <1.0                          | No <sup>c,d,e,f,h</sup>                            | <1.0                         | No <sup>c,d,e,f,h</sup>                            |

<sup>a</sup> No State Water Quality Criteria for this compound.

<sup>b</sup> Does not comply with marine acute criteria.

<sup>c</sup> Does not comply with the freshwater chronic criteria.

<sup>d</sup> Does not comply with the marine chronic criteria.

<sup>e</sup> Does not comply with water and fish ingestion criteria for protection of human health.

<sup>f</sup> Does not comply with the fish consumption criteria for protection of human health.

<sup>g</sup> Cannot determine compliance, no detection limit reported.

<sup>h</sup> Does not comply with freshwater acute criteria.

Durkin and Emmett (1980) reported water quality variables pertaining to habitat classification in the Columbia River Estuary. They collected data during four survey periods at three-month intervals between June 1977 and March 1978. These data include surface and bottom measurements of temperature, salinity, conductivity, turbidity, pH, and dissolved oxygen for 45 sites from Baker Bay and from Youngs Bay to Cathlamet Bay, including the Tongue Point area. Temperature varied seasonally and ranged from 42 to 67 °F. Specific conductivity for the Tongue Point stations ranged from 0.08 to 4.57  $\mu$ mhos/cm; salinities ranged from 0.06 to 3.0 ppt. Turbidity in the vicinity of Tongue Point ranged from 4.5 to 20 FTU, and pH ranged from 6.65 to 8.5. Oxygen concentrations were within safe limits established for aquatic life and ranged from 7.2 to 12.2 mg/L. Samples collected during low flow conditions in September exhibited the highest temperature, conductivity, and salinity values.

The Columbia River Estuary Data Development Program (Envirosphere, 1980) includes data on temperature, salinity, density, dissolved oxygen, nutrient concentration, and radioisotope data from the early 1900s up to 1980, and includes some water quality data collected in the vicinity of Tongue Point. These data indicate that in general, temperatures vary seasonally in

conjunction with changes in air temperature and that salinity and conductivity are generally low. Conditions are predominantly freshwater; however, in late summer, more brackish water conditions may occur. Dissolved oxygen data in the vicinity of Tongue Point and Cathlamet Bay are generally greater than 10 mg/L. Turbidity varies seasonally but is generally moderate in this area. The pH of the water in the vicinity of Tongue Point is between 6.5 and 8.5. Nutrient concentrations in the vicinity of Astoria in 1966 were on the order of 0.2-1.0  $\mu\text{M}$  phosphate, 1-30  $\mu\text{M}$  nitrate and 70-200  $\mu\text{M}$  silicate. These concentrations of nutrients are in the range expected for unimpacted fresh waters.

Other water quality data have been collected at sites farther downstream or upstream from Tongue Point and are therefore less representative of water quality in the vicinity of the proposed project. Long-term water quality data sets are limited to U.S. Geological Survey water quality monitoring stations at RM 39 near Bradwood, Oregon (1973 to 1980), RM 53.6 near Beaver Army Terminal (1990 to 1991), and RM 141 near Warrendale, Oregon (1972 to 1989). Data from these areas are reported in the U.S. Environmental Protection Agency's STORET database. Data for these sites include measurements of conventional water quality parameters, ions, nutrients, trace metals, and bacteria. The Warrendale and Bradwood water quality stations are no longer being monitored. The U.S. Geological Survey will continue to monitor the Beaver Army Terminal station.

The Columbia River Bi-State Water Quality Program measured water quality parameters at 45 stations between the river mouth and Bonneville dam from September 24, 1991 to October 11, 1991. As part of this survey, three sites were sampled along a transect extending from Tongue Point to Grays Bay on October 9, 1991. At each of these sites, measurements were made of pH, temperature, conductivity, dissolved oxygen, total suspended solids, turbidity, hardness, fluoride, and metals (aluminum, antimony, arsenic, nickel, selenium, silver, thallium, zinc, and cyanide). The draft report, which will include these water quality data, will be available in June, 1992 (Ellis, pers. comm., January 7, 1992).

In addition to the Bi-State Water Quality Program, the Service has been conducting investigations on the Columbia River to determine if fish and wildlife are accumulating harmful concentrations of certain environmental contaminants. Sediments and biological samples were collected during the spring and summer of 1990 and 1991 from eight sites along the Columbia River, including a site in Cathlamet Bay. A portion of the samples have been tested for organochlorine pesticides, PCBs, dioxins, furans, and mercury. Preliminary results of the samples tested show some elevated concentrations of dioxins and furans, especially from two addled eagle eggs collected from the estuary in the spring of 1991. The Service anticipates having summary reports of their analysis available in the summer of 1992.

### **C. Groundwater**

Geotechnical Resources, Inc. (1991) installed groundwater observation pipes in the south-central portion of South Tongue Point. Water level readings of the static groundwater table taken on



September 15, 1991, ranged from 4.8 feet from the existing ground surface elevation to 0.6 feet. Geotechnical Resources, Inc. anticipates that the depth to the water table fluctuates in response to seasonal precipitation, especially the spring freshet, and is not significantly influenced by the daily tidal fluctuations of the Columbia River.

#### **D. Drainage**

Although South Tongue Point is relatively flat, it drains to lower elevations at the perimeter of the site from the relative high point at the center. The soil type of the upland area is Tropopsamments. According to the Soil Conservation Survey for Clatsop County, this soil type is excessively drained, with very rapid permeability.

#### **E. Water Courses and Flood Plains**

There are no surface water courses located on the upland portion of South Tongue Point. The John Day River at the southern end and Mill Creek at the northern end of South Tongue Point are major natural drainage channels in this area.

According to information provided by the Portland District of the Corps, the 100-year flood elevation at South Tongue Point is 9.2 feet NGVD. This is consistent with the 100-year flood elevation shown on the Federal Emergency Management Agency Flood Insurance Rate Maps for the Astoria area. The site elevation ranges from 7 to 16 feet NGVD. The Corps has not calculated a floodway for this section of the Columbia River.

#### **F. Wetlands**

A wetland delineation was conducted for the South Tongue Point project site in September and October of 1990 (Scientific Resources, Inc., 1990) and confirmed by David Evans and Associates, Inc. biologists in November, 1991. The wetland determination was performed in accordance with the "routine on-site" method (Federal Interagency Committee for Wetland Delineation, 1989). Other sources of information used in the site analysis included U.S. Geological Survey topographical quadrangles (Astoria and Cathlamet Bay, Oregon), U.S. Fish and Wildlife Service National Wetland Inventory maps (Astoria and Cathlamet Bay, Oregon), U.S. Soil Conservation Service Soil Survey of Clatsop County (Soils Conservation Service, 1988), an enlargement of a color infrared aerial photograph (Corps, 1989, 1 inch = 400 feet), a previous wetland delineation report by the Corps (1987), and the National List of Plant Species that Occur in Wetlands: Northwest (Region 9) (Reed, 1989).

One-foot-diameter pits were excavated at a total of 22 sampling sites to a depth of at least 18 inches, and observations of soils and hydrology were made. Vegetation cover estimates were also made within a 30-foot radius at each sample site. All dominant plant species occurring within the sampling radius were identified. Vegetation, soil, and hydrology information was recorded on standard wetland determination sheets, and the wetland status was determined for

each site. In areas where the demarcation of soils and hydrology between upland and wetland were less clear, the location and plotting of certain segments of the wetland/upland boundary were determined through a confirmation of dominant hydrophytic vegetation (Scientific Resources, Inc., 1990).

Approximately 61 acres were determined to be wetlands (as defined by the Corps), and 73 to be uplands (Scientific Resources, Inc., 1990) (Figure 3-4). The Corps accepted this wetland delineation as correct (Corps, November 5, 1990).

No delineation has been performed for the wetland area between South Tongue Point and North Tongue Point. This area of tidal mudflats was estimated by the ordinary high water mark.

#### **3.1.1.6      Air Quality**

At the present time, air quality in the Astoria area meets all Oregon Department of Environmental Quality standards. The Oregon Department of Environmental Quality monitored the Astoria area approximately 10 years ago, mainly for particulates related to several industries present in the area. There were no violations, so monitoring was ceased. In general, coastal air quality is good because of the consistent ventilation (MacKellar, pers. comm., November 15, 1991).

South Tongue Point is located in an area that is designated by the U.S. Environmental Protection Area as being in attainment of the National Ambient Air Quality Standards.

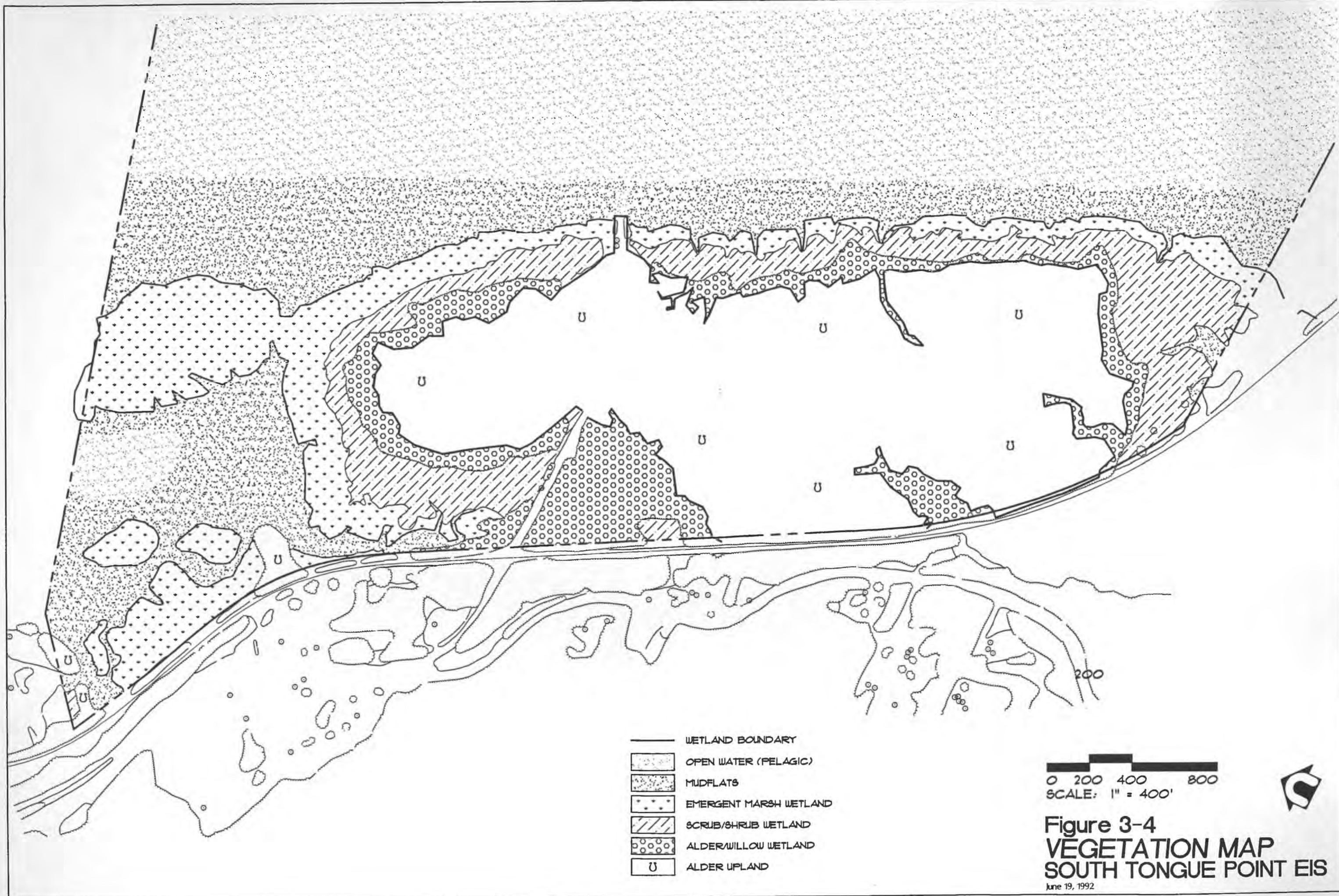
#### **3.1.1.7      Noise and Activity**

##### **A.      Noise**

The human ear responds to a very wide range of sound intensities. The decibel scale used to describe sound is a logarithmic rating system that accounts for the large differences in audible sound intensities. An A-weighted (dBA) scale is used because it best measures the sounds to which the human ear is sensitive. This scale accounts for the human perception of a doubling of loudness as an increase of 10 dBA, so a 70-dBA sound level is twice as loud as a 60-dBA sound level.

Statistical levels ( $L_1$ ,  $L_{10}$ , and  $L_{50}$ ) are used to define allowable noise levels in any one hour according to the Oregon Department of Environmental Quality, Chapter 340, Oregon Administrative Rules, Division 35, entitled "Noise Control Regulations for Industry and Commerce," amended April 1983.  $L_1$  is the level at which 1 percent of the sound pressure levels (SPLs) measured are above and 99 percent are below;  $L_{10}$  is the level at which 10 percent of the SPLs are above and 90 percent are below; and  $L_{50}$  is the level at which 50 percent of the SPLs are above and 50 percent are below. The acceptable levels for a new industrial site next to a quiet residential area are shown on Table 3-2.





**Figure 3-4**  
**VEGETATION MAP**  
**SOUTH TONGUE POINT EIS**  
June 19, 1992

**TABLE 3-2**  
**ALLOWABLE NOISE LEVELS IN ONE HOUR**  
**FOR INDUSTRIAL USES ADJACENT TO QUIET RESIDENTIAL AREAS**  
**IN A-WEIGHTED DECIBELS (dBA)**

|                          | $L_1$ | $L_{10}$ | $L_{50}$ |
|--------------------------|-------|----------|----------|
| Daytime (7 AM - 10 PM)   | 60    | 55       | 50       |
| Nighttime (10 PM - 7 AM) | 55    | 50       | 45       |

Source: R&W Engineering, Inc., 1992.

Existing noise levels were measured at three locations on South Tongue Point and near the intersection of the proposed new access road and U.S. Highway 30 (Figure 3-5 and Table 3-3). Measurements were also taken at an existing barge fabrication facility to provide a basis for projecting future noise levels at South Tongue Point. Measurements were conducted in accordance with the methodology outlined in the State of Oregon Department of Environmental Quality measurement procedures manual NPC-1.

The levels for traffic noise contribution were computed according to U.S. Department of Transportation Federal Highway Administration pamphlet FHWA-RD-77-108 entitled "FHWA Highway Traffic Noise Prediction Level." A single number descriptor ( $L_{eq}$ ) is used for traffic generated noise. This descriptor is a statistical level that accounts for the characteristics of traffic noise. The  $L_{10}$  is approximately equal to the  $L_{eq}$  plus 3. Where the future U.S. Highway 30 intersection is proposed, the noise level at current peak hour traffic has an  $L_{eq}$  of 75 dBA.

For the three sites measured at South Tongue Point, higher values (representing more noise) were measured at a site 520 feet from U.S. Highway 30 with sparse trees between the highway and the location, and lower values (representing less noise) were measured at a site 920 feet from U.S. Highway 30 in dense trees and brush which obstructed the measuring point from the highway. The third site on South Tongue Point was 1,020 feet from U.S. Highway 30 with little vegetation between the location and the highway, and the measured values at this site were between those measured at the other two sites. At a quiet time, 9:00 PM, the  $L_1$  levels were 42 to 43 dBA at distances of 920 and 1,020 feet, respectively. This background SPL includes U.S. Highway 30 traffic plus local noises such as frogs and birds. Based on these noise measurements, this area would be characterized as quiet.





TABLE 3-3

**MEASURED SOUND PRESSURE LEVELS AT SOUTH TONGUE POINT  
IN A-WEIGHTED DECIBELS (dBA)**

|                                                                               | $L_1$ | $L_{10}$ | $L_{50}$ |
|-------------------------------------------------------------------------------|-------|----------|----------|
| On-Site:                                                                      |       |          |          |
| Daytime                                                                       | 48-55 | 43-50    | 39-45    |
| Nighttime                                                                     | 42-43 | 39       | 33-34    |
| Off-Site (U.S. Highway 30):                                                   |       |          |          |
| Daytime                                                                       | 82    | 78       | 40       |
| Nighttime                                                                     | 79    | 67       | 36       |
| Barge Fabrication:<br>Measured at 50 feet<br>Peak = 103 SPL<br>(intermittent) | 80    | 74       | 66       |

Source: R&W Engineering, Inc., 1992.

Noise levels at the existing barge fabrication site ranged from 66 to 80 dBA, measured at 50 feet (Table 3-3).

#### **B. Activity**

South Tongue Point supports very low levels of activity at the present time. The Corps Astoria Field Station constitutes the only use, with approximately 10 employees and a single vessel which leaves the pier approximately two to three times a week during the winter months and six to eight times a week during the summer months.

North Tongue Point supports moderate levels of activity at the present time. A number of commercial and industrial uses are subleasing space from Cars, Inc., which has a lease for the land from the Division through 1993, with a 20-year renewal option. These uses consist of ship and barge lay berthing, a metal fabrication plant, and warehouses. Boat traffic in and out of North Tongue Point is not heavy at the present time (Purchase, pers. comm., November 12, 1991).

The level of activity in Cathlamet Bay varies seasonally. Beyond the boat activity described above for the Corps Astoria Field Station and North Tongue Point, both commercial and recreational boat traffic passes through Cathlamet Bay. Commercial traffic consists largely of log raft towing and fishing vessels. An average of one log raft tow passes South Tongue Point every two days. The numbers of commercial fishing vessels in the area depends on the season. During the gillnet season (early winter and early spring for several weeks each), an average of two to three fishing boats use Cathlamet Bay, with an average of six more passing through on a daily basis (Christensen, pers. comm., November 20, 1991).

The majority of the vessels seen in the Cathlamet Bay are recreational boats used for fishing or sight-seeing. Most of these launch from the John Day Boat Ramp, located near the mouth of the John Day River. As many as 50 to 75 recreational boats may use Cathlamet Bay daily between Memorial Day and Labor Day (Christensen, pers. comm., November 20, 1991). The total number of boat days for the portion of the Columbia River within Clatsop County in 1990 was 69,519, with the majority used for fishing (MacHugh et al., 1990).

### **3.1.1.8      Public Facilities**

#### **A.      Transportation**

Existing access to South Tongue Point is provided by a two-lane roadway, 18 feet wide. The access road starts at U.S. Highway 30 as a public right-of-way and is stop-sign controlled at this intersection. This intersection is skewed and has inadequate sight distance both towards the east and west along U.S. Highway 30. Access into the site has a nine percent downgrade from U.S. Highway 30 and enters the subject property on an elevated causeway (Figure 3-2).

At the present time, U.S. Highway 30 is estimated to have an average weekday two-way traffic volume of 8,350 vehicles. The highway is estimated to be carrying a total two-way volume of 720 vehicles in the peak hour, with 8 percent of the traffic consisting of medium and heavy trucks.

The Astoria Bypass, an improvement project planned by the Oregon Department of Transportation, would provide a new travel route south of the City of Astoria and connect to U.S. Highway 30 on the west side of the City. When the project is completed, Oregon Department of Transportation may transfer jurisdiction of the portion of U.S. Highway 30 north and west of the new alignment to Clatsop County. The Astoria Bypass is scheduled for construction in 2000.

The existing access road has an at-grade crossing with the Burlington Northern Railroad track at the project site's western boundary. The Corps currently uses a private crossing at this point. At the present time, there is no rail access to South Tongue Point.



The Oregon Department of Transportation has prepared a Multimodal Study for U.S. Highway 30 (May 1991). This study addresses economic development opportunities along U.S. Highway 30 and identifies related transportation improvements. The study specifically mentions that there is . . . *agreement on the need for improving rail structures, [and] development of Tongue Point near Astoria . . .*

#### **B. Storm Drainage**

Storm water runoff on South Tongue Point drains to lower elevations at the perimeter of the site from the high point at the center. The soil type of the upland area is Tropopsamments. According to the Soil Conservation Survey for Clatsop County, this sandy soil type is excessively drained, with very rapid permeability.

A culvert under the existing access road and east of the railroad line provides natural drainage flow to the north. The relatively small diameter and height of the culvert (36 inches, according to as-built drawings) restricts the interconnection of the wetlands north and south of the access road, resulting in some circulation problems (Barnes, 1991a). Water elevation in areas on both sides of the culvert is tide-influenced.

#### **C. Sanitary Sewer**

South Tongue Point is not presently served by a municipal sewage system, but the Astoria Comprehensive Plan calls for future City sewer services for the area. The City of Astoria's sanitary sewage treatment system consists of a series of aerated lagoons located on the shore of the Columbia River just west of the Job Corps site at North Tongue Point. The Job Corps operates a privately owned collection system and lift station which serves the Job Corps facility and the Emerald Heights area. The Emerald Heights connection is planned to be rerouted to drain directly by gravity to the Astoria collection system and treatment plant, thus creating additional capacity in the Job Corps lift station.

#### **D. Domestic Water Supply**

The entire City of Astoria is gravity fed through a 21-inch-diameter transmission main. Sufficient pressure is presently maintainable through properly designed distribution mains without the use of booster pumping equipment. The extensive topographic relief of the area requires pressure reducing and regulating valves.

Astoria's water system presently has the capacity to supply water for industrial development at South Tongue Point, assuming that future development includes only one operation with large process water demands. The existing water system capacity is sufficient for peak demands, or fire flows based on ordinary hazard building use and size.

Astoria's system includes a 200,000,000-gallon reservoir and slow sand filtration system in the foothills of the Coast Range. This filtration system was recently placed on-line; some start-up and operational problems are now being addressed by the City. The system is designed to process 5.0 million gallons per day (mgd) on average, and 7.0 mgd on a peak-day basis. Astoria's current average demands are estimated to be 3.5 mgd during winter months, and 3 to 3.5 mgd during the summer, with summer peak days approaching design capacity. During peaking periods, the Skyline area experiences some supply and reduced pressure problems. Although the supply falls short of demand occasionally, the pressure head on the City's 21-inch transmission line, controlled by pressure-reducing stations, is not the problem. The problem may be that the pressure-reducing stations are operated beyond their design operating flow ranges. The City does not consider this problem to be significant.

The Job Corps facility at North Tongue Point has an existing private water system which is supplied by the City of Astoria.

#### **E. Utilities**

Utility distribution to South Tongue Point at the present time is above ground along the access road to the existing Corps Astoria Field Station facility and consists of electricity (Pacific Power and Light) and telephone lines. There is no natural gas line to the site. Solid waste is taken to a transfer station on a weekly basis, and transported from there to a landfill in McMinnville.

#### **3.1.1.9 Hazardous Materials**

##### **A. Upland Hazardous Materials**

GSA cannot dispose of surplus lands until the property is known to be free of contaminants. Because of this, a Phase I Environmental Assessment was performed at South Tongue Point in 1991 (Sweet-Edwards/EMCON, 1991). This study found that the northwest portion of South Tongue Point was once used as a landfill for steel drums containing glycols, bleach solutions, hydraulic fluid, cleaning solutions, petroleum hydrocarbons, and unknown materials. Several dozen exposed and partially buried, corroded 30- and 50-gallon steel drums were observed on the site. The study concluded that these materials may have leaked and impacted surface soils and ground water. The study also found signs of petroleum hydrocarbon releases on the Corps Astoria Field Station site, and that there are three approximately 40-year-old underground storage tanks that were used for petroleum fuel storage on South Tongue Point.

According to the Corps (Hepler, pers. comm., November 19, 1991), the Astoria Field Office was placed on the Federal Facilities Hazardous Waste Compliance Docket in 1988 due to the suspected improper disposal of waste materials. As a result of this listing, field investigations have been performed at the facility. The following is a summary of the results of the investigation:

1. A 200- by 250-foot parcel of land located in the western portion of the 135-acre property (combined GSA and Corps property), was found to have numerous 55-gallon drums, 30-gallon drums, ship batteries, and miscellaneous items in various stages of decomposition.
2. A second 100- by 100-foot parcel of land located immediately west of the Corps fenced compound was found to contain partially buried drums in a decomposed state.
3. Geomagnetic surveys were conducted in 1991 that indicated subsurface metals at both of the sites described above. No other areas showed magnetic anomalies.
4. Three separate field inspections by Corps scientists and engineers have determined that the primary waste disposal areas have been identified; these are the areas described above. No other areas within the property show indications of past or ongoing waste disposal.
5. Markings on the materials found indicate that they are ship-related materials deposited in the late 1950s. Use of the facility at that time was by the Maritime Commission, whose function at that time was to decommission ships used during World War II.

Sampling of soil and materials in selected containers was completed in 1991. Cleanup of the facility is being conducted by the Corps.

#### **B. Sediment Hazardous Materials**

A number of sources have documented the testing for hazardous materials in the sediments in the vicinity of North Tongue Point that may have been introduced when the Tongue Point Naval Station occupied the Basin during and following World War II (Batelle, 1988; U.S. Geological Survey, 1986; Ingels, 1989), and the detrimental effects that these materials may have on the biological component of Cathlamet Bay (Garret et al., 1986).

In 1989, the Corps dredged the navigation channel to North Tongue Point. At that time, the Corps sampled and tested the sediments in the channel area (including a bioassay analysis) and found that they were sufficiently free from contaminants to be suitable for ocean disposal. The Corps removed an average of 8 to 10 feet of sediments, lowering the elevation of the channel from approximately 25 feet MLLW to 34 feet MLLW. Approximately 2 million cubic yards of material were removed. The Corps has continued to conduct bioassay analysis at the ocean disposal site for the last 3 years, and has found no evidence of contamination or adverse effects on aquatic wildlife (Mason, pers. comm., 1992; and Siipole, 1992).



Sediment sampling was conducted in 1990 as part of an inquiry conducted by CARS, Inc. into the feasibility of dredging between the finger piers at North Tongue Point. A U.S. Environmental Protection Agency (EPA) analysis of the sampling data concluded that sediments in the 0- to 4-foot layer were suitable for aquatic disposal. The EPA suggested that the sediments below 4 feet deep were sufficiently contaminated with metals, polycyclic aromatic hydrocarbons, and pesticides that further testing of these sediments was needed before dredging was accomplished (Malek, 1991).

The difference between contamination levels in the navigation channel and the pier area at North Tongue Point is a common phenomenon (Siipole, pers. comm., 1992). This may be the result of the typically more frequent dredging of navigation channels compared to the less frequent dredging of pier areas. At North Tongue Point, the known history of ship decommissioning was most likely the source of the contaminants found by the CARS, Inc. sampling.

In 1990 and 1992, the Corps took samples of surface sediments in the biotic zone at a point off South Tongue Point that is roughly in the same location as the proposed Navy pier, at the Mill Creek embayment, and east of Lois Island. The purpose of this sampling was to test for the presence of contaminants that could pose a hazard to bald eagles and other wildlife. The samples were tested for heavy metals, pesticides (including DDE and DDT), polyaromatic hydrocarbons, and PCB. The results of the testing showed insignificant levels of these contaminants (Dorsey, pers. comm., 1992).

Less is known about the condition of the sediments in the access channel area at South Tongue Point. The MARAD Basin was used for storing merchant ships following World War II; some concern exists that hazardous materials related to this activity (such as paint) may be located in the sediments adjacent to South Tongue Point. At the known shoaling rates in the area of 0.2 to 0.4 feet per year, these materials, if present in the sediments, would be located at a minimum depth of approximately 4 feet below the basin floor.

### **3.1.2 BIOLOGICAL ENVIRONMENT**

#### **3.1.2.1 Vegetation**

Because South Tongue Point is a young land formation (approximately 40 years old), the vegetation is relatively simple, consisting almost entirely of early seral stage colonizers. Plant materials such as algae and phytoplankton are present in the water surrounding South Tongue Point. This section gives a brief history of the vegetative development of South Tongue Point and describes the six plant communities involved -- open water, mudflats, emergent marsh wetland, scrub/shrub wetland, alder willow wetland, and alder upland (Figure 3-4). Also included is a brief characterization of the vegetation types that are located in the intertidal area between North and South Tongue Points immediately east of the Burlington Northern Railroad track.

The section concludes with a discussion of rare, threatened, or endangered species that may occur in the project vicinity. An inventory of plant species recorded on South Tongue Point is included as Table 1 of Appendix B.

#### A. Plant Communities

After the creation of South Tongue Point in the early 1950s, European beachgrass (*Ammophila arenaria*) was planted to stabilize the surface from wind erosion. The tree, shrub, and herbaceous vegetation that now exists on the site has invaded this area by natural processes over the last 40 years. Very little of the European beachgrass remains, and American dunegrass (*Elymus mollis*) is now common in the uplands on the northern third of the site.

In 1990, the vegetation found on South Tongue Point was surveyed during a wetlands evaluation of the site conducted in September and October of 1990 (Scientific Resources, Inc., 1990) and by David Evans and Associates, Inc. biologists in November, 1991. An inspection of historical aerial photographs for this study indicated that the patterns of vegetation on South Tongue Point have not changed significantly since 1968, except that vegetation in all areas of the site has become more robust and dense. Approximately 61 acres have been determined to be wetlands (as defined by the Corps) on South Tongue Point (Scientific Resources, Inc., 1990), and 73 to be uplands. The Corps has accepted this wetland delineation as correct (Corps, November 5, 1990). No delineation was done for the area between South Tongue Point and North Tongue Point.

Open water vegetation was catalogued during a survey of the Lower Columbia River Estuary conducted by the Corps (Corps, 1987).

#### Open Water (Pelagic) Vegetation

Phytoplankton and algae are the primary producers of organic materials that form the lowest trophic level of the estuary, providing an important food source for invertebrates such as amphipods, clams, copepods, and shrimp. Phytoplankton living in the water column, in particular diatoms, contribute over half of the total productivity in the estuary. Microalgae, principally diatoms, also provide the chief source of production on the subtidal and shallow intertidal mudflats; however, these areas are limited in the estuary and do not contribute significant amounts of production.

Phytoplankton populations in the Columbia River Estuary are dominated by freshwater diatoms (Frey et al., 1984) and are essentially a downstream extension of the upriver plankton community (Haertel et al., 1969). The most abundant phytoplankton in the estuary during studies by Oregon State University researchers (Frey et al., 1984) included *Asterionella formosa*, *Melosira indica*, *M. italica*, *Fragilaria crotonensis*, *Cyclotella glomerata*, and *Stephanodiscus astraea*. These species were also abundant in the estuary during earlier studies by Haertel et al. (1969) and are common in other major rivers.

Primary production by phytoplankton in the Columbia River Estuary appears most limited by the amount of incoming solar radiation and the attenuation of light within the water column (Frey et al., 1984). Nutrients, particularly nitrogen, may also limit phytoplankton growth at times during the spring and summer (Haertel et al., 1969; Frey et al., 1984). Phytoplankton in the estuary tend to be most abundant during the spring high flow season, moderately abundant during the summer low flow period, and present at very low levels of abundance during the winter fluctuating flow season. Frey (1984) found that on an annual basis, individual phytoplankton imported to the estuary are more abundant than phytoplankton produced in the estuary.

Microalgae are the most abundant group of plants on the tidal flats of the Columbia River Estuary. Primarily diatoms, they constitute an important food source for many benthic invertebrates, both filter feeders and detritivores. Oregon State University researchers have studied these algae and found the dominant taxa in Cathlamet Bay to include *Navicula gregaria*, *Fragilaria pinnata*, *Achnanthes lanceolata*, *Amphora ovalis* v. *pediculus*, *Nitzschia* cf. *palea*, *Cocconeis* sp., *Asterionella formosa*, *Melosira italica*, and *Fragilaria crotonensis* (McIntyre and Amspoker, 1984). The benthic microalgae of the bay have been found to have generally lower rates of primary production (carbon) than those in many other areas of the estuary (McIntyre and Amspoker, 1984). Marine macroalgae and seagrasses contribute to primary productivity in the lower estuary, but are less important in the vicinity of South Tongue Point (Corps, 1987).

#### Mudflats

These intertidal to slightly subtidal areas are generally found between the emergent marsh and the open water, deep subtidal areas. They appear as unvegetated, level areas, but are actually gently sloping and vegetated by microalgae, principally diatoms. Microalgae provide the chief source of production on these "flats." Mudflats are limited in the estuary overall. In the immediate vicinity of South Tongue Point, mudflats are found east of the low marsh vegetation extending both north and south in a band around most of South Tongue Point proper.

Extensive mudflats are also found in the area between South Tongue Point and North Tongue Point, intergrading into emergent marsh wetland. This area is roughly oval shaped at low tide.

#### Emergent Marsh Wetland

These areas are very productive intertidal areas which are vegetated with mostly non-woody species. They vary in elevation from high to low within the intertidal zone and provide food and cover for mammals, fish, and invertebrates. Typical dominant vegetation includes a variety of sedges and rushes (*Scirpus* spp. *Carex* spp., and *Juncus* spp.), cattails (*Typha latifolia* and *Typha angustifolia*), and a few willows (*Salix* spp.).



### Scrub/Shrub Wetland

Willows (*Salix* spp.) dominate this high intertidal area and add vertical structure to this vegetative community which has many of the species of the high emergent marsh zone in the understory, such as slough sedge (*Carex obnupta*) or horsetail (*Equisetum* spp.) This vegetative type is transitional between the emergent marsh and the alder/willow wetland community and is found in a fairly wide band around the site. Many of South Tongue Point's cottonwood trees are found in the upper portion of the scrub/shrub wetland where it interfaces with the alder/willow wetland.

### Alder/Willow Wetland

This vegetation type consists of red alder (*Alnus rubra*) and willows (*Salix* spp.) as the dominant overstory species with a variety of species, including slough sedge, horsetail, and Columbia River touch-me-not (*Impatiens capensis*), well-represented as dominant in the understory. This zone blends subtly into the upland alder community.

Very small areas of alder/willow vegetation are found north of the existing South Tongue Point entrance road and immediately east of the intersection of the railroad and North Tongue Point.

### Alder Upland

The dominant upland vegetation on the site is almost entirely deciduous with red alder dominating the tree layer over the site. Other important species are Hooker's willow, red elderberry (*Sambucus racemosa*), Scot's broom (*Cytisus scoparius*), Indian plum (*Oemlaria cerasiformis*), salmonberry (*Rubus spectabilis*), Himalayan and evergreen blackberry (*Rubus discolor* and *R. laciniatus*), sword fern (*Polystichum munitum*), and a few grasses, such as American dunegrass and velvetgrass (*Holcus lanatus*). The upland area also includes a few balsam cottonwoods (*Populus balsamifera trichocarpa*), Oregon white oak (*Quercus garryana*), Douglas fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*), and western red cedar (*Thuja plicata*).

## **B. Threatened, Endangered, and Sensitive Plant Species**

According to the Oregon Natural Heritage Program Data Base (1991a), there are no Federally or State-listed Threatened or Endangered plant species or other sensitive plant species known to occur on South Tongue Point or in similar habitat within the project vicinity (Oregon Natural Heritage Program Data Base, 1991b). Two species included on the Oregon Natural Heritage Program List 4 (taxa which are not currently threatened or endangered but are very rare or are declining in numbers) are found within the regional vicinity of South Tongue Point; however, the habitat found on the site is not appropriate for either of these species. These are:

- Yellow rattle (*Rhinanthus crista-galli*); found in moist, open areas; and
- Small-flowered sessile trillium (*Trillium parviflorum*); found in moist, shady mature woods.

*Rare and Endangered Plants of Oregon* (Eastman, 1990) describes a number of plant species that are considered to be rare in Oregon, although not listed by the State or Federal governments as Threatened or Endangered. One species included on this list, the wapato (*Sagittaria latifolia*), was located in the southern portion of the site during the wetland delineation survey (Scientific Resources, Inc., 1990), and during David Evans and Associates, Inc. site surveys in November 1991. This species was once abundant in the marshes along the Columbia and Willamette Rivers in western Oregon and was an important food source for the aboriginal population. Wapato now occurs only in a few protected areas.

The range of a number of rare plant species includes South Tongue Point; however, the habitat of the project site is not appropriate for any of these species:

- Fairy slipper (*Calypso bulbosa*), found on steep slopes;
- Snow orchid (*Eburophyton austinae*), found in mature coniferous forests;
- Oregon fawn-lily (*Erythronium oregonum*), found in moist woods, gravelly prairies, stony ridges, and damp hillsides;
- Coast trout-lily (*Erythronium revolutum*), found in mature conifer forests and on streambanks;
- Gnome plant (*Hemitomes congestum*), found in mature conifer forests;
- Howell's quillwort (*Isoetes howellii*), found in ephemeral pools; and
- Hall's isopyrum (*Isopyrum hallii*), found on streambanks and on wet, rocky walls.

One unusual plant species, the ditch stonecrop (*Penthorum sedoides*), has been located in the southern portion of the site adjacent to the railroad tracks (Thomas, 1990; Barnes, pers. comm., August 16, 1991; Bruner, pers. comm., August 16, 1991), and was also located during David Evans and Associates, Inc. site surveys in November, 1991. This plant, which was described as a first occurrence in the Pacific Northwest during a 1984 survey of the lower 40 river miles of the Columbia River Estuary (Thomas, 1984), is native to flood plain forests, swamps, marshes and marshy shores, ditches, wet clearings, and swales from Maine to Ontario, Canada and Minnesota, and generally southward to northern Florida and the panhandle of Texas (Godfrey and Wooten, 1981). It is conjectured that this out-of-range occurrence is the result of plant seeds or other propagules "hitch-hiking" on cargo that was unloaded in the area, or possibly in the pockets of persons also hitch-hiking on a train. The plant is highly associated on the site with soil disturbance, such as ditch maintenance. The presence of the ditch stonecrop is an unusual botanical occurrence that may be of interest to botanists; however, the plant is not a Federally or State-listed species.

Thomas (1984) also reports two other unusual but not Federally or State-listed plant species, *Aneilema keisak* and *Peltandra virginica*, as new records for the Northwest during the same survey of the lower 40 river miles of the Columbia River Estuary. Both of these species are also native and common to the southeastern United States (Godfrey and Wooten, 1981; Radford et al., 1976). Both plants, described by Thomas as freshwater tidal emergent marsh species, were located on Lois Island in the 1984 survey (Thomas, 1990), and a population of *Peltandra virginica* was located in Burnside Marsh just east of Eskaline Creek (Thomas, 1984), approximately 4.5 miles east of South Tongue Point. Neither plant was found on South Tongue Point during the 1984 survey. Both species were searched for during David Evans and Associates, Inc. site surveys in November, 1991, and neither was located.

### 3.1.2.2 Fish and Wildlife

#### A. Fish and Wildlife Species Observed and Expected

The Lower Columbia River Estuary is a diverse complex of shallow and deep water, mudflats, marshes and uplands. All of these habitats are found on or in the immediate vicinity of South Tongue Point. On the project site, although both upland and wetland plant communities are recognized, it should be noted that the two communities provide very similar wildlife habitat.

This section focuses on the benthic invertebrates and zooplankton, fish, mammal, and bird species that have the most ecological importance to the portion of the Lower Columbia River Estuary immediately surrounding the project site, and concludes with a discussion of rare, threatened, or endangered wildlife that may occur in the area. A list of the fish and wildlife species observed and expected on or in the vicinity of South Tongue Point is included as Tables 2 through 6 of Appendix B.

#### Benthic and Zooplankton Species

Estuarine invertebrates include zooplankton and benthic and epibenthic organisms. The zooplankton reside in the water column and are an important food source for a variety of juvenile and planktivorous (plankton-eating) adult fish. Benthic invertebrates reside in the sediments, while epibenthic invertebrates reside on the sediments. These invertebrates are the primary prey for a number of commercially important fish species in the Columbia River Estuary.

The zooplankton assemblage in the general vicinity of South Tongue Point includes both freshwater and brackish-water tolerant species of cladocerans, copepods, rotifers, amphipods, and mysids (Appendix B, Table 3). Freshwater zooplankton in the Columbia River Estuary are dominated by the copepod, *Cyclops* spp., and the cladocerans, *Bosmina* spp. and *Daphnia* spp. (Haertel and Osterberg, 1967; Seaman, 1977; Jones and Bottom, 1984). Collectively, the freshwater species are most abundant in upper portions of the water column during the summer



low flow period, somewhat less abundant during high spring flows, and least numerous during the winter fluctuating flow season.

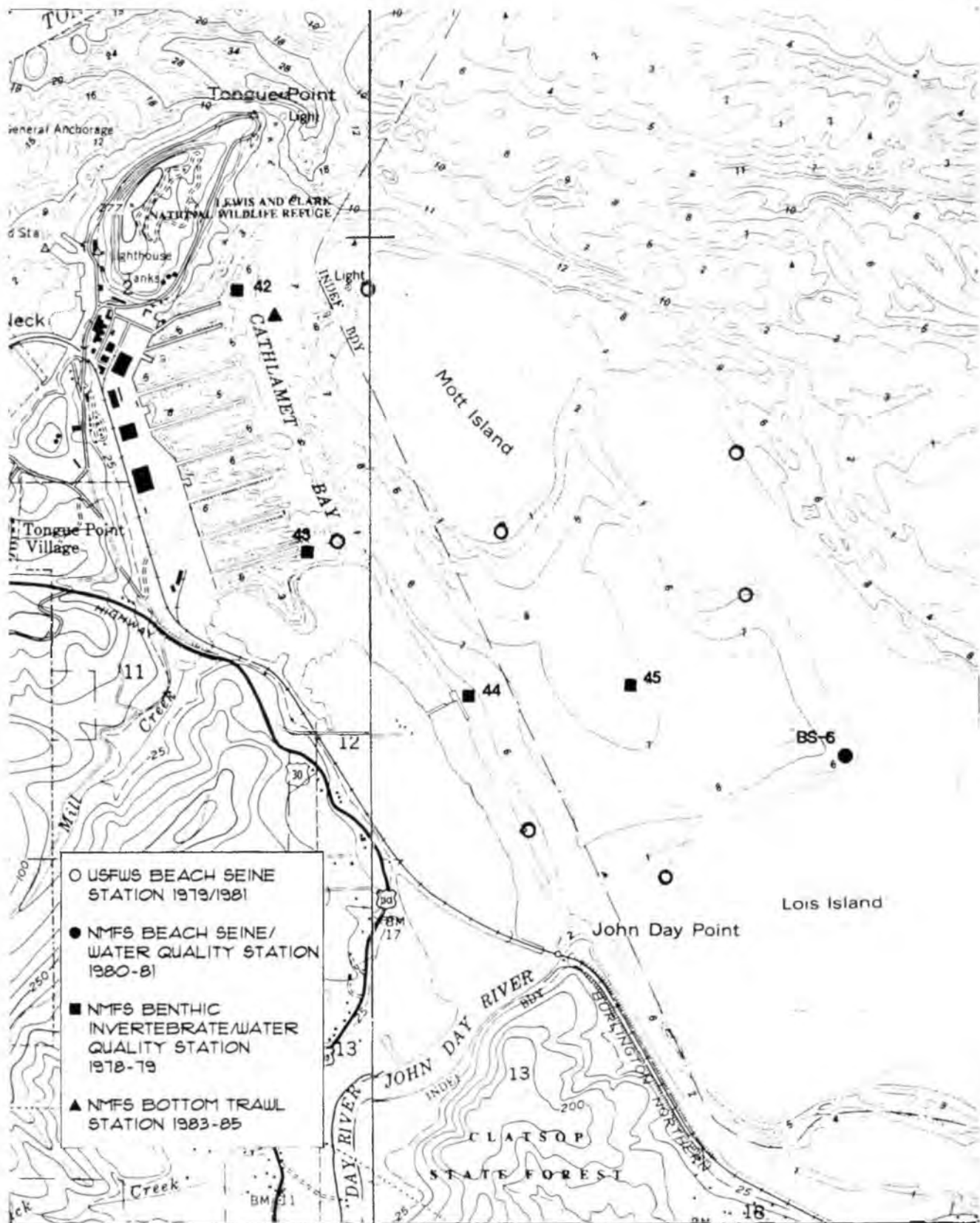
Brackish-tolerant species of zooplankton found at or near South Tongue Point are dominated by a calanoid copepod, *Eurytemora affinis*, and the harpacticoid copepod, *Scottolana canadensis* (Haertel and Osterberg, 1967; Jones and Bottom, 1984). Both of these species are generally more abundant in deep water than closer to the surface because of these copepods' affinity for the brackish water often concentrated along the riverbottom (Haertel et al., 1969). Near the project site, the abundance of both species probably peaks during the summer low flow season, because their general abundance in the estuary is relatively high during the summer and saline intrusion is greatest at that time of year.

Zooplankton at South Tongue Point are an important component of the local food web, and may also have a minor effect on estuarine processes elsewhere within the Columbia River Estuary. Jones and Bottom (1984) have suggested that similar low-velocity areas may serve as refuges which help replenish zooplankton populations in adjacent portions of the main Columbia River channel.

Invertebrates dwelling on or in the bottom sediments of the estuary constitute a critical food source for a variety of commercially important fish species. The spatial distribution and seasonal abundance of these benthic invertebrates is variable and depends upon several factors, particularly sediment characteristics, salinity, and current velocity. The benthic invertebrates most frequently consumed by fish in the Columbia River Estuary include amphipods (*Corophium* spp. and *Eogammarus* spp.), harpacticoid copepods (*Scottolana canadensis*) and mysid shrimp (Bottom et al., 1984). Areas in which these benthic invertebrates are abundant, particularly intertidal and shallow subtidal habitats, tend to be very important feeding areas for estuarine fishes.

Western Cathlamet Bay, including the South Tongue Point area, supports a relatively high density of benthic invertebrates (Appendix B, Table 4) that makes it an important feeding area for fish (Beak Consultants, Inc., 1981; Ingels, 1989). Benthic invertebrates have been sampled from portions of the bay near the project site (Figure 3-6), but not from all habitat types which may be affected by the proposed project. The National Marine Fisheries Service (Durkin and Emmett, 1980; Emmett et al., 1986) has sampled populations of these organisms in deep subtidal habitat between the mouth of John Day River and Tongue Point, including the MARAD Basin. There appears to have been little or no sampling of benthic invertebrates within intertidal or shallow subtidal areas close to the project site.

Durkin and Emmett (1980) conducted seasonal studies of benthic invertebrates at four deep subtidal stations along the western edge of Cathlamet Bay (Figure 3-6) as well as at 41 other stations in the Columbia River Estuary. They found invertebrates in deep subtidal areas near the project site to be abundant and dominated by copepods, oligochaetes, and amphipods (Appendix B, Table 4; Figure 3-7). Copepod and amphipod abundance near the site showed



**Figure 3-6**  
**BIOLOGICAL SAMPLING**  
**STATIONS FOR BENTHIC**  
**INVERTEBRATES AND FISH**  
**SOUTH TONGUE POINT EIS**

June 19, 1992

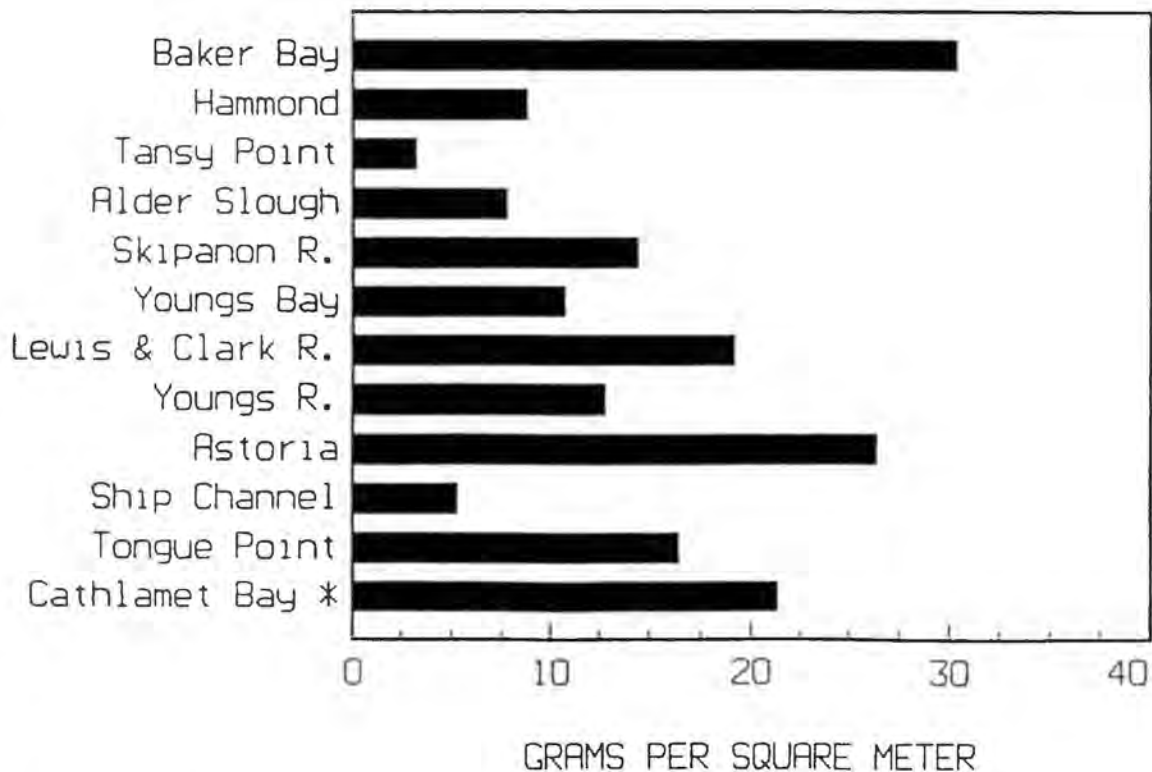
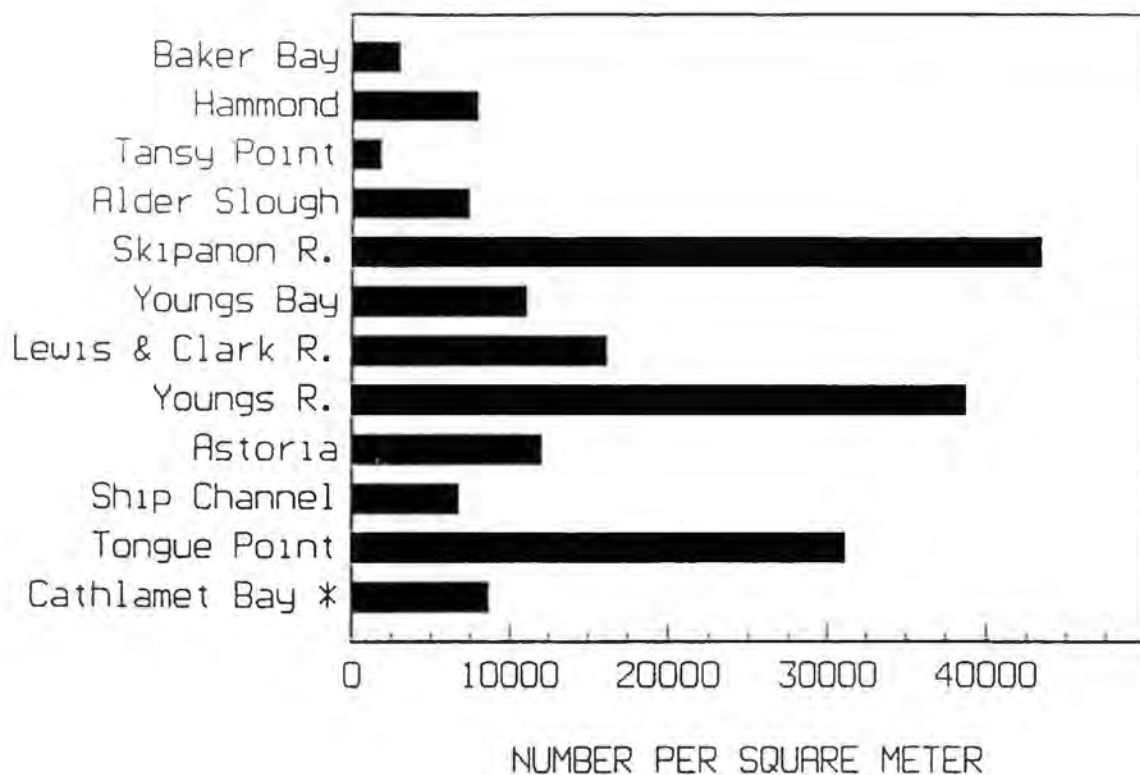


Figure 3-7 Mean annual number (top) and weight (bottom) of invertebrates sampled from various sites in the Columbia River Estuary. All locations other than "Cathlamet Bay" (\*) were sampled by Durkin and Emmett (1980), while "Cathlamet Bay" was sampled by Emmett et al. (1986).



strong seasonal trends with a peak in amphipod numbers during June and copepod numbers greatest in March.

When compared to other areas of the Columbia River Estuary, deep subtidal areas Durkin and Emmett (1980) sampled along the western edge of Cathlamet Bay (Figure 3-6) had some of the highest recorded annual densities of benthic invertebrates (Figure 3-8). The most abundant invertebrates were the harpacticoid copepod (*Scottolana canadensis*), several species of oligochaetes, and the gammarid amphipod (*Corophium salmonis*). *Scottolana* may be a prime food source for the mysid shrimp (*Neomysis mercedis*), which occur near the project site in large numbers (Emmett, 1991). Other important benthic invertebrates found near the project site include a year-round resident, the Asian clam (*Corbicula manilensis*), and juvenile sand shrimp (*Crangon franciscorum*), a summer resident noted by Emmett (1992). Dungeness crabs (*Cancer magister*) are not found near the project site because salinities are always too low.

Amphipod abundance, particularly that of *Corophium* spp., is often used as an indicator of key feeding areas for juvenile salmonids in the Columbia River Estuary. Although *Corophium* spp. are seasonally abundant in the deep subtidal habitat that Durkin and Emmett (1980) sampled near South Tongue Point, this habitat type is generally not heavily used by salmonids because it is deeper than their preferred intertidal and shallow subtidal habitat. *Corophium* abundance in this deeper habitat may reflect similar or greater abundance in adjacent shallow habitats, given that sediment textures and salinities in the shallow habitats appear to be suitable for the amphipod. Intertidal and shallow subtidal areas at the project site should be considered very productive feeding areas for juvenile salmonids unless invertebrate sampling within them suggests otherwise.

### Fishes

Recent comprehensive studies of fishes in the Columbia River Estuary have identified 75 species which utilize the estuary on at least a seasonal basis (Bottom et al., 1984). Twenty-nine fish species have been found near South Tongue Point (Appendix B, Table 5; Figure 3-6). These include seven species of salmonids and 22 non-salmonid species. Salmonids, a group of fishes that includes salmon and trout, are emphasized in the following discussion because of their importance to commercial, Native American, and sport fishing, and because several declining species are represented by this group of fishes. All of the salmonid species occurring in the vicinity of South Tongue Point are anadromous, meaning that they spawn upstream in a freshwater environment, rear freshwater or in the estuary, and mature in the ocean.

The fish community at the project site and elsewhere within the estuary is dominated by juveniles of anadromous species and by marine species which spawn in the ocean or estuary, then rear as juveniles in the estuary for varying periods of time. The period of estuarine residence is likely quite short for several species of fish which have been found in the vicinity of the site.

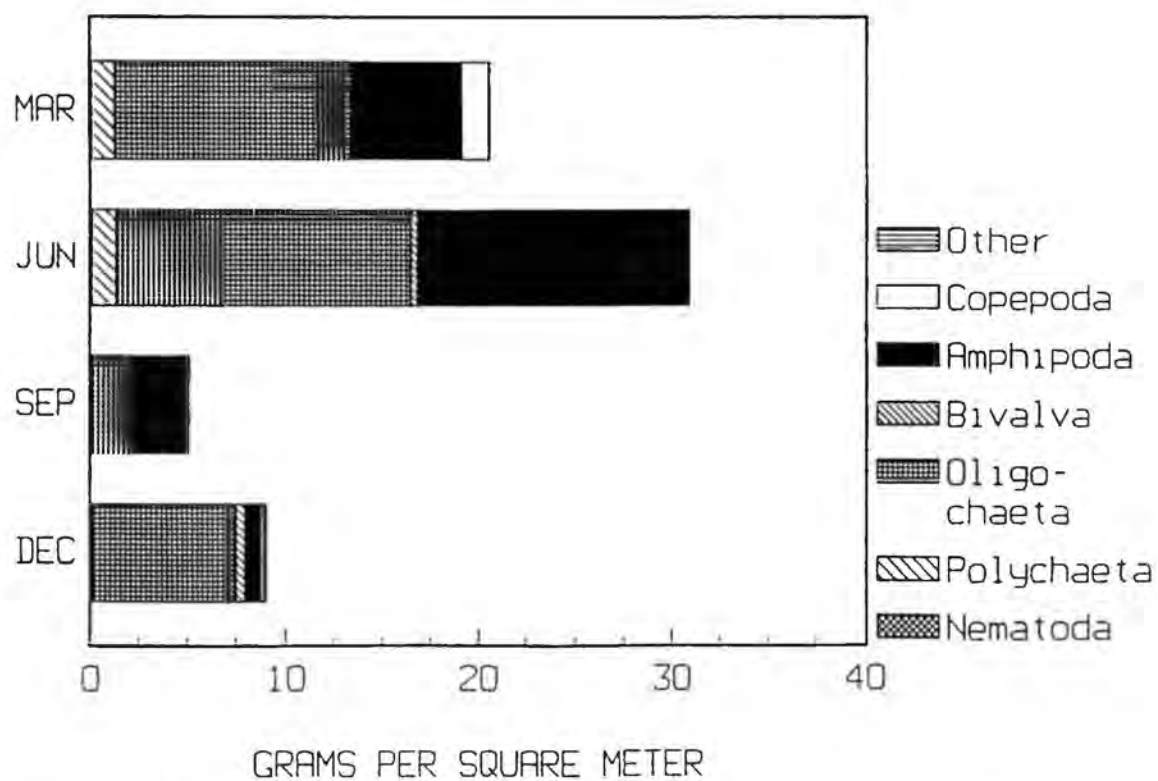
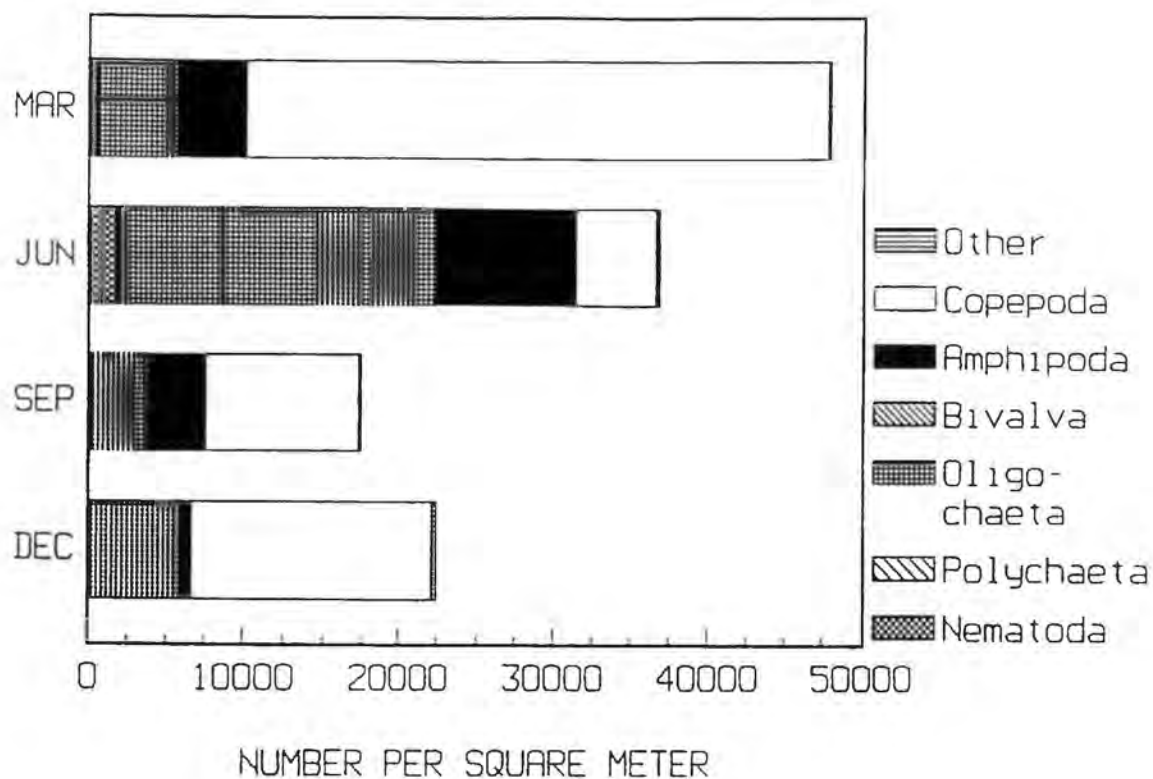


Figure 3-8 Composition by number (top) and weight (bottom) of benthic invertebrates sampled from four stations near South Tongue Point, Oregon (Durkin and Emmett 1980).

Fish habitat in the vicinity of South Tongue Point can be broken into three major types: (1) intertidal, (2) shallow subtidal, and (3) deep subtidal habitat (Figure 3-9). Intertidal and shallow subtidal habitats tend to be those most heavily used as rearing areas by juvenile fish, particularly salmonids. The distinction made between shallow and deep subtidal habitat is whether a particular area has water depths less or greater than 10 feet at mean lower low tide. The 10-foot depth includes the zone of greatest biological activity and is the depth below which habitat use by the majority of juvenile salmonids within the upper estuary is substantially reduced (Dawley et al., 1986).

Fish abundance at or near South Tongue Point varies both by habitat type (Appendix B, Table 5) and by season (Figure 3-10). Fishes that are at times abundant within nearby intertidal and shallow subtidal habitats (sampled by beach seine) include salmonids (primarily chinook and lesser numbers of coho and chum salmon), peamouth, starry flounder, three spine stickleback, American shad, shiner perch, and sculpins. Abundance of the salmonids within this habitat is greatest during spring, with the collective abundance of other fishes highest during summer.

The fish assemblage in deep subtidal habitat near the project site (sampled by bottom trawl) is strongly dominated by non-salmonid species and includes relatively minor numbers of salmonids. Fishes commonly found in this habitat include starry flounder, prickly sculpin, longfin smelt, Pacific staghorn sculpin, threespine stickleback, shiner perch, peamouth, Pacific tomcod, and white sturgeon. Total fish abundance in deep subtidal habitat seems less variable among seasons than that within intertidal and shallow subtidal areas near South Tongue Point. This is probably related to seasonal use of the shallower habitats by large numbers of small juvenile fish.

There are no records of fish sampling in the upper water column of deep-water areas near South Tongue Point. Fish species which are at least seasonally abundant within this pelagic (open water) habitat are probably found in at least limited numbers within adjacent shallow areas. Fish which could be expected in the pelagic habitat near the project site include juvenile salmonids, American shad, Pacific herring, northern anchovy, and smelt.

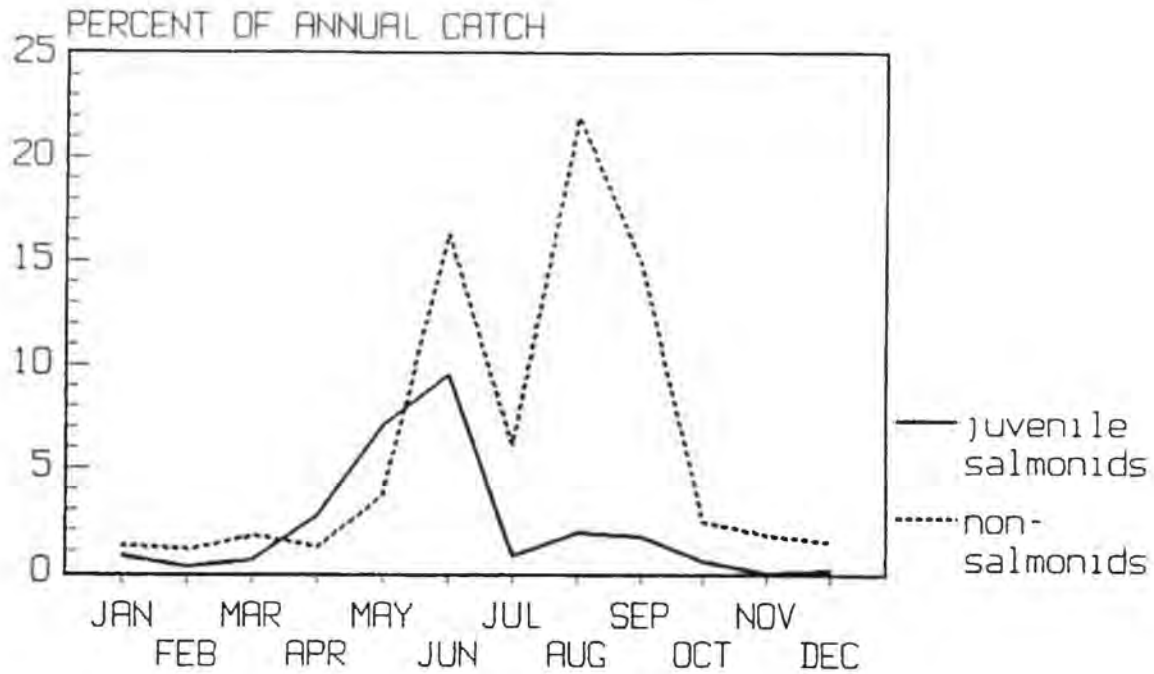
**Salmonid Fishes:** The Columbia River drainage supports runs of anadromous salmonids (salmon and trout) which are commercially and recreationally important. These runs depend on the Columbia River Estuary as: (1) a migration route for adult fish returning toward their natal streams or hatcheries; and (2) a place where juvenile fish can feed and adjust from fresh to salt-water before entering the ocean. The period of estuarine residency is quite short for the juveniles of most species of anadromous salmonids in the drainage, but can be longer for some species. Juvenile fall chinook and chum salmon, both of which enter the Columbia River Estuary as subyearling fish, may require a somewhat extended period in an estuary to ensure good survival in the marine environment (Healy, 1980; Simenstad and Eggers, 1981; Healy, 1982; Levy and Northcote, 1982; Herring and Nicholas 1983).

Bottom et al. (1984) reviewed information on fish in the Columbia River Estuary and found it consistent with the hypothesis that a period of estuarine residence was important to the growth





# NMFS BEACH SEINE (1980-81)



# NMFS BOTTOM TRAWL (1983-85)

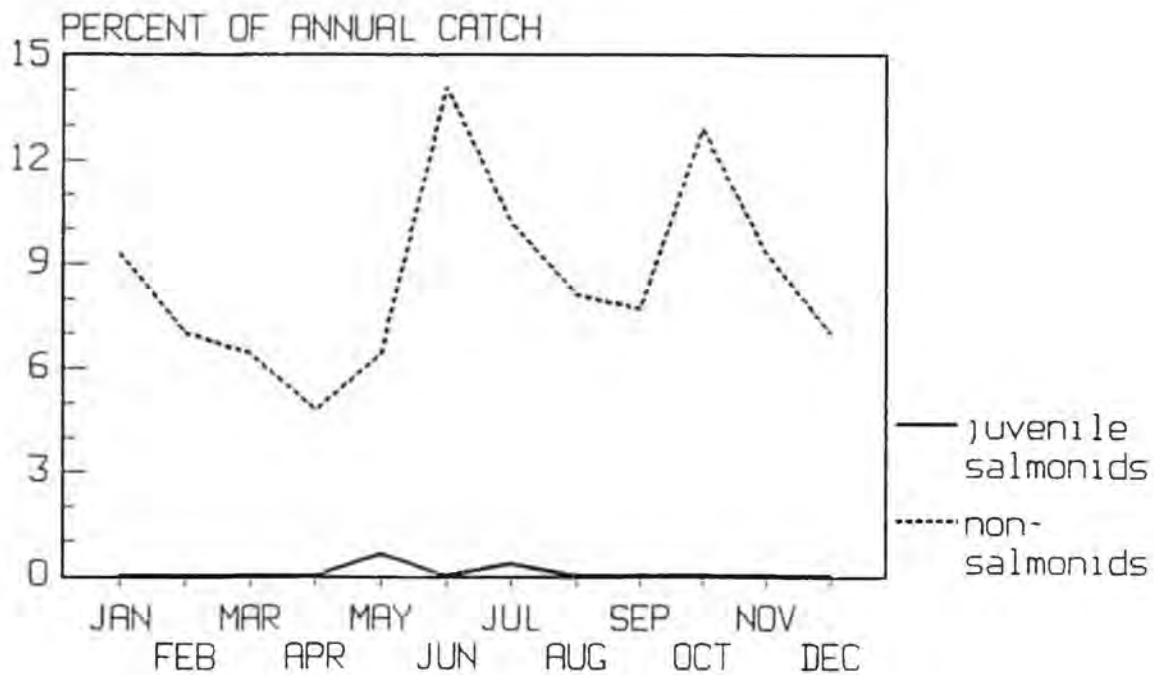


Figure 3-10 Seasonal abundance for salmonid and non-salmonid fishes captured by National Marine Fisheries Service using beach seines (in intertidal/shallow subtidal habitat) and a bottom trawl (in deep subtidal habitat) near South Tongue Point, Oregon (McCabe 1991a,b).

and survival of subyearling (fall) chinook. They also examined National Marine Fisheries Service data (Dawley et al., 1982) on the migration rates of juvenile anadromous salmonids down the Columbia River and through the estuary. The data showed that fall chinook subyearlings tend to slow their downstream migration when reaching the estuary. The fall chinook also moved more slowly through the estuary than did juvenile spring/summer chinook, coho, and steelhead (Bottom et al., 1984).

The western edge of Cathlamet Bay is heavily utilized by juvenile salmonids (Olhausen, 1980; Cates, 1983). With respect to the rest of the Columbia River Estuary, it is the only area in which the relative abundance of juvenile chinook is considered high on a year-round basis (Fox et al., 1984). The National Marine Fisheries Service has captured juvenile chinook or other salmonids in intertidal/shallow subtidal habitat near the project site during every month of the year (McCabe, 1991b).

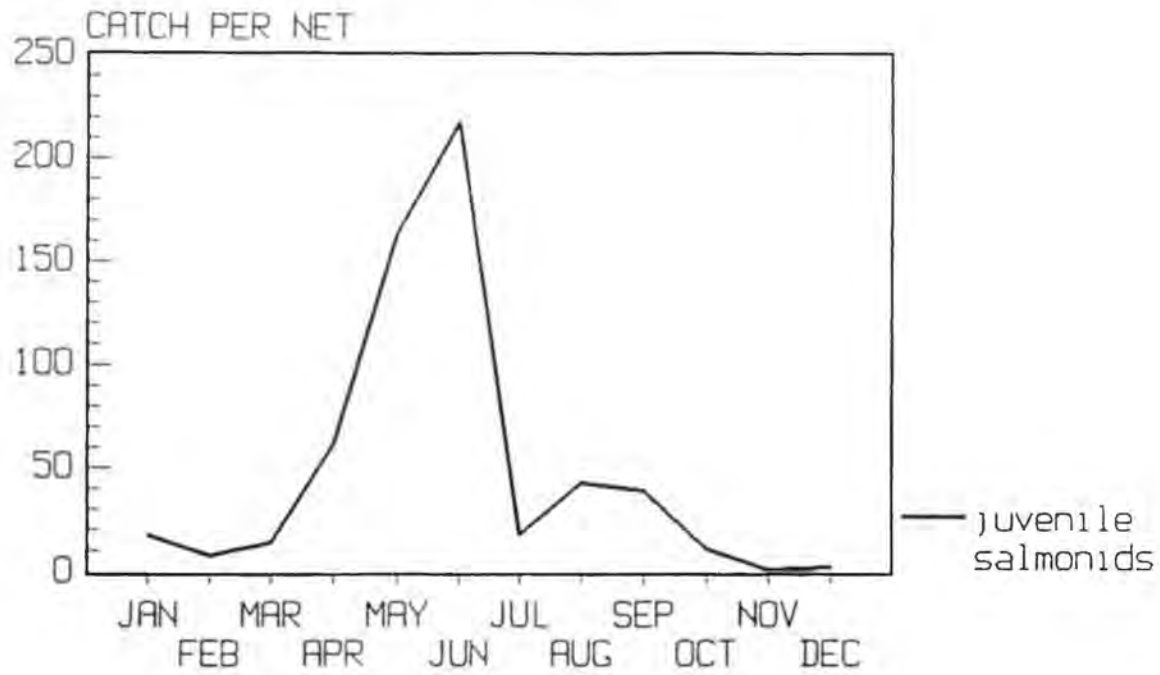
As they are throughout the estuary, juvenile salmonids are most abundant near the project site during the spring high flow season, less abundant during the summer low flow period and least abundant during the winter fluctuating flow season (Figure 3-11). Juvenile fall chinook are far more numerous than the other salmonid species present, followed in abundance by chum and coho salmon, then cutthroat trout (Olhausen, 1980). Chum salmon abundance near the site peaks earlier in the year than that of coho, which peak earlier than the chinook (Cates, 1983). Very few juvenile spring/summer chinook salmon or steelhead have been captured near the project site. This is probably due to the tendency of those fish to travel rapidly through the estuary in deep channels of the main river (Emmett, 1992).

Juvenile salmonid abundance in the vicinity of South Tongue Point is generally lower than, and very strongly influenced by, the numbers of juvenile salmon migrating down the main Columbia River channel during spring and summer (Smith, 1981; Cates, 1983). The fish apparently migrate from the main channel to areas near the project site. Since most juvenile salmon moving down the river are now of hatchery origin, the timing and magnitude of fish releases from upstream hatcheries can have a dramatic effect upon salmonid utilization of aquatic habitat at the project site. Smith (1981) found that most juvenile salmonids captured near South Tongue Point from April to September 1979 were hatchery fish. Cates (1983) found similarly high numbers of hatchery fish in catches of juvenile salmonids made near the site from March through August 1981.

Stomach analyses of juvenile salmonids captured near South Tongue Point from May through September 1979 showed that the fish were feeding primarily upon amphipods, Diptera, and small crustaceans (Olhausen, 1980). The amphipod *Corophium salmonis* made up 80 percent of their diet, while *Diptera* and the crustacean *Neomysis mercedis* comprised 8 and 7 percent, respectively. Five percent of the diet was other organisms, probably including the copepod *Scottolana canadensis* and cladocerans of the genus *Daphnia*.



NMFS (1980-81)



USFWS (1981)

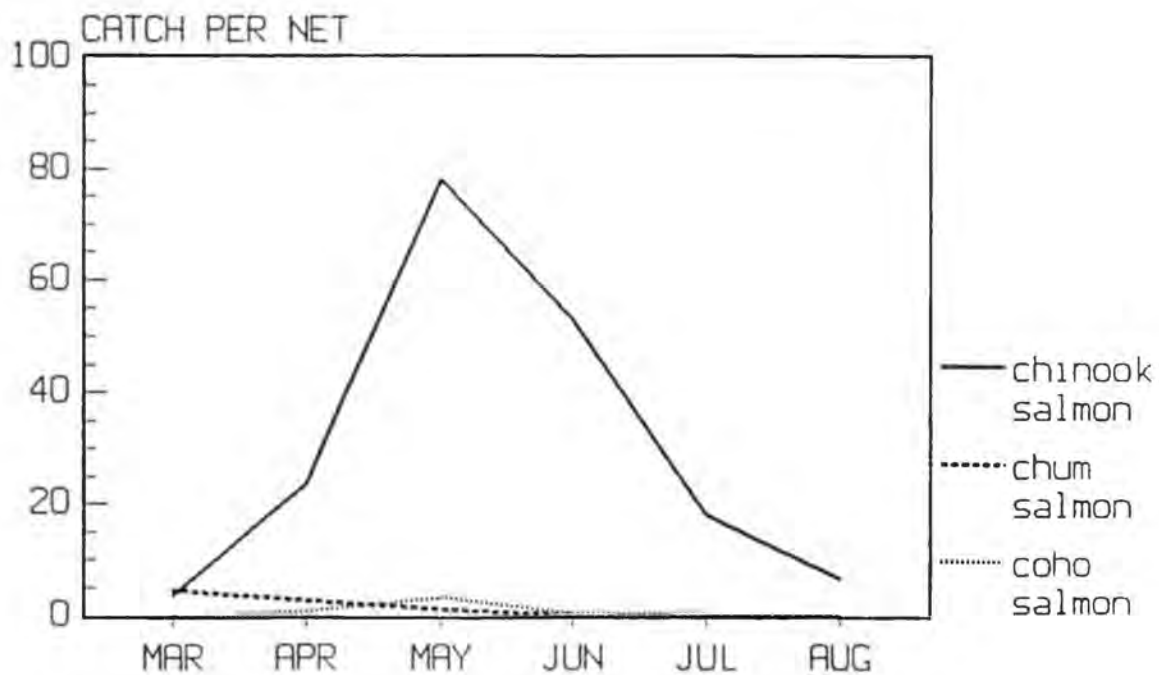


Figure 3-11 Seasonal abundance (catch per beach seine [net] set) of all juvenile salmonids (top) and of three species of salmon (bottom) in intertidal/shallow subtidal habitat near South Tongue Point, Oregon (McCabe 1991b and Cates 1983).

June 19, 1992

There are no site-specific data for the food habits of salmonids in the vicinity of South Tongue Point from October through April. However, it is likely that the food habits of fish near the project site at that time of year are similar to those of juvenile salmonids elsewhere in the estuary. This would suggest that from October through April, the major prey of salmonids near South Tongue Point include insects and *Corophium salmonis* (Bottom et al., 1984).

Brief narrative descriptions of the salmon and trout which have been found in the Columbia River Estuary near South Tongue Point are given below. The descriptions are based on information provided by Bottom et al. (1984), Fox et al. (1984), Monaco et al. (1990), Emmett et al. (1991) and others.

- Chinook salmon. The chinook salmon supports valuable commercial, Native American, and sport fisheries. Relative to all fish species found in estuaries along the West Coast, chinook are highly abundant in the Columbia River Estuary. The Columbia River supports three distinct runs of these fish based on the time at which adults enter the river: spring (January through May), summer (June through August) and fall (August through November). The juveniles, particularly those of fall chinook, are most abundant in the estuary during spring and early summer, sometimes rearing for an extended period of time in the estuary before entering the ocean. Juveniles in the estuary prefer intertidal, shallow subtidal, and pelagic habitats where they can feed on gammarid amphipods (especially *Corophium salmonis*), insects, harpacticoid copepods, mysids, or decapod larvae. The juveniles are in turn preyed upon by several species of piscivorous (fish-eating) fish, birds, and mammals.

Commercial fishing has been observed targeting adult fall chinook near the mouth of Mill Creek, just north of South Tongue Point (Emmett, 1992). It is believed that the fish in that area are returning to Big Creek Hatchery, approximately 10 miles east of South Tongue Point on the Oregon side of the Columbia River.

- Coho salmon. The coho salmon also supports important sport and commercial fisheries. It migrates upstream through the estuary as adults in late summer and fall. The juveniles migrate downstream in spring as yearling or older fish. With respect to other fish found in West Coast estuaries, both juvenile and adult coho are abundant in the Columbia River Estuary.

Juvenile coho tend to move rapidly through the estuary, eating mainly gammarid amphipods (*Corophium* spp.) and insects at the water surface. They tend to be highly opportunistic feeders and are fed upon by many of the same animals that eat juvenile chinook.

- Chum salmon. Chum salmon from the Columbia River drainage contribute to a minor commercial fishery but support no targeted sport fisheries. Both adult and

juvenile chum are of moderate abundance in the Columbia River Estuary. Adult chum migrate upstream through the estuary during fall and their offspring migrate seaward during the following spring as very small juveniles. The juveniles often rear for a period of time in the estuary before continuing out into the ocean.

Juvenile chum salmon are opportunistic feeders that prefer shallow-water habitats as protection against predation by other fishes. They feed on benthic invertebrate prey like harpacticoid copepods and gammarid amphipods (including *Corophium salmonis*), but may eat other crustaceans and terrestrial insects.

- Sockeye salmon. The sockeye salmon is of moderate, seasonal abundance in the Columbia River Estuary. Sockeye found in the Columbia spawn in several lake-headed tributaries situated in upper portions of the drainage. They help support an ocean fishery but are generally not targeted by sport fishing.

Juvenile and adult sockeye are present in the Columbia River Estuary during spring and early summer. The juveniles tend to move very rapidly through the estuary's main channels, perhaps eating insects, amphipods like *Corophium* spp. and mysid shrimp.

- Steelhead trout. Steelhead are moderately abundant in the Columbia River Estuary, which they use primarily as a migration corridor between the river and the ocean. They support Native American and sport fisheries at many upstream locations within the Columbia River drainage. Adult steelhead are present in the estuary year-round, while juveniles move downstream through its main channels during the spring freshet. Juvenile steelhead often eat very little in the Columbia River Estuary (Emmett, 1992), but sometimes consume gammarid amphipods, small crustaceans, insects, and small fish (Loch, 1982; Dawley et al., 1986).

- Cutthroat trout. The coastal cutthroat is a popular, anadromous game fish that is common in the Columbia River Estuary. Adult cutthroat move upstream from October through March to spawn in their natal streams, then return to the estuary after spawning, typically from January through April (Loch, 1982). Small juveniles remain in the natal stream for several years, then migrate to the estuary. Large juvenile and adult cutthroat in the estuary are highly piscivorous.

**Non-Salmonid Fishes:** Aquatic habitat at and near South Tongue Point supports a variety of non-salmonid fishes (Appendix B, Table 5). These fishes include freshwater and estuarine species as well as anadromous and marine species. Although the area is dominated by fresh or sometimes very mildly brackish water, saline intrusion during low river flows allows several marine species to become part of the local fish assemblage for relatively short periods of time.



Brief narrative descriptions of several species of non-salmonids found in the Columbia River Estuary near South Tongue Point are given below. The descriptions are based on information provided by Bottom et al. (1984), Fox et al. (1984), Monaco et al. (1990), Emmett et al. (1991) and others.

- White Sturgeon. The white sturgeon is an anadromous species that spends time in the estuary, in upstream segments of the Columbia River and in the marine environment. The species is common in the estuary and is represented by both juvenile and adult fish in the vicinity of South Tongue Point. Adult sturgeon in the estuary and upriver in the Columbia support an important sport fishery. Sturgeon anglers often fish in the waters surrounding the project site (Beak Consultants, Inc., 1981; Ingels, 1989; Emmett, 1991).

White sturgeon spawn well upriver of South Tongue Point, in rapid currents over coarse substrate. They are broadcast spawners with adhesive eggs and larval young that are strongly associated with the riverbed. The larvae prefer riverine habitat and have not been found near the project site. Juvenile and adult sturgeon are benthic carnivores. Small juveniles eat benthic invertebrates including amphipods, mysid shrimp, bivalves, and insect larvae. Larger juveniles and adults eat fish (eulachon, young shad, northern anchovy and other species), clams, amphipods, mysids, and *Crangon* shrimp.

Sturgeon are very long-lived and may concentrate pollutants because of their longevity and benthic feeding habits. They are usually found in deep channel habitat and sometimes in shallow subtidal areas but not intertidal areas. However, they do sometimes feed on intertidal mudflats at high tide.

- American Shad. The American shad is an anadromous species which was introduced to the Columbia River drainage in the late 1800s. The species is found throughout the Columbia River Estuary in all types of habitat. Adult shad support an important sport fishery and a minor commercial fishery.

Shad spawn primarily upriver from the estuary, with adults migrating through the estuary toward preferred spawning areas during June and July. Peak downstream migrations of juvenile shad into the estuary and to South Tongue Point occurs in November and December. The juveniles can be very abundant in the estuary at that time, feeding heavily and growing substantially while using the estuary as a nursery. They are pelagic feeders that eat a variety of prey that includes *Daphnia* spp., *Corophium salmonis*, and the mysid *Neomysis mercedis*.

- Pacific Herring. The Pacific herring is a marine pelagic species that uses the Columbia River Estuary as a nursery and feeding area. Adult herring migrate into the estuary from the ocean during the spring to feed and spawn. The herring

are broadcast spawners, and spawning occurs in saline water from April to July, with peak activity in June and July. No spawning takes place near the project site. Small numbers of herring larvae and juveniles begin appearing in the estuary during spring, and the abundance of juveniles increases as summer progresses.

Pacific herring have been found near the project site only briefly during the summer low flow period when saline intrusion may occur. Saline intrusion is a rare event in the vicinity of South Tongue Point. When Pacific herring are present near the site, juveniles are much more abundant than adults.

Juvenile and adult Pacific herring are pelagic plankton feeders. In the Columbia River Estuary they eat primarily copepods and cladocerans like *Daphnia*. The herring also consume mysids, amphipods, decapod larvae, and fish larvae while themselves providing an important forage base for several species of estuarine and marine fishes. They are also used as fishing bait and for human consumption.

- Northern Anchovy. The northern anchovy is a marine pelagic species that is sometimes commercially fished. The species spawns in the ocean, but all life stages can be highly abundant in the Columbia River Estuary. Anchovy eggs and larvae are apparently swept into the estuary during flood tides. Juveniles and adults are pelagic feeders, eating primarily copepods, other zooplankton, and some phytoplankton.

Like the Pacific herring, Northern anchovy are found near South Tongue Point only during very brief periods of maximum saline intrusion. Northern anchovy are important prey for many large predatory fish in the estuary and ocean. Key anchovy predators include adult chinook and coho salmon.

- Eulachon. Known to most dipnet fishermen as "smelt", this anadromous osmerid spawns in tributaries to the lower portion of the Columbia River. Spawning runs of these fish typically support important sport (net) fisheries.

All life stages of the eulachon lifecycle except juveniles are seasonally abundant in the Columbia River Estuary. The species seems to be present at only low levels of abundance near South Tongue Point. Adult fish migrate through the estuary to spawn in riverine freshwater from December through April. Later, larval eulachon drift down into the estuary to consume phytoplankton, copepods, ostracods, cladocerans, and mysids as they grow larger. Juveniles rear in the ocean and are not found in the estuary.

- Surf Smelt. The surf smelt is a pelagic marine species that is important prey for many fishes, birds, and mammals. It spawns in the marine environment and has

larvae which drift into the Columbia River Estuary during flood tides. Adults and larvae of the species are common in the estuary, and juveniles are abundant. The species is not particularly common at South Tongue Point.

Juvenile and adult surf smelt are pelagic feeders that eat primarily planktonic amphipods, copepods, cladocerans, and crustacean larvae. They are in turn eaten by a variety of predatory fish, including adult salmon.

- Longfin Smelt. The longfin smelt is an anadromous osmerid (belonging to the smelt family of fishes) that spawns in the Columbia River Estuary, perhaps even in the general vicinity of South Tongue Point. It is found in most types of estuarine habitat and can tolerate a wide range of salinities. Longfin smelt are abundant throughout the estuary during most of the year. They are pelagic feeders that eat mainly calanoid and harpacticoid copepods and cladocerans of the genus *Daphnia*. The species also consumes the gammarid *Corophium salmonis* and the mysid *Neomysis mercedis*.

Longfin smelt are an important prey of many estuarine fish and other animals. Their key predators include adult salmon, other piscivorous fish, and several species of birds.

- Pacific Tomcod. The Pacific tomcod is a relatively large, demersal (benthic-oriented) marine species not generally targeted by commercial or sport fishing. The species spawns in the ocean. Juvenile and adult tomcod inhabit relatively deep marine or brackish habitats that have bottoms of mud, silt, and fine sand. Tomcod eat *Crangon* shrimp, fish, polychaetes, gammarid amphipods (including *Corophium salmonis*), mysids, and other invertebrates. Juvenile tomcod are found at the bottom of the MARAD Basin and other deep subtidal areas near South Tongue Point during periods of maximum salinity intrusion.

- Threespine Stickleback. The threespine stickleback is a small fish that is abundant in the Columbia River Estuary and at South Tongue Point. All life stages of the species are found in association with vegetation and shallow water, although the species winters in deep water. Juvenile and adult stickleback are opportunistic carnivores that feed on copepods, cladocerans, ostracods, aquatic insect larvae, snails, terrestrial insects, annelids, and amphipods. They are important prey for larger salmonids and other fish, birds, and some mammals.

- Shiner Perch. Shiner perch are small marine fish that are able to tolerate brackish water. They are found in many types of habitat within the Columbia River Estuary and strongly prefer shoreline areas, weak currents, sandy or muddy bottoms, and vegetative or other structure. Adult shiner perch migrate into the estuary during spring, bear their young in the early summer and migrate back to

the ocean in late fall. All life stages of the species can be quite abundant within the estuary. Both juveniles and adults are frequently present near the project site, particularly in summer or fall.

Juvenile and adult shiner perch are omnivorous. They prey upon both benthic organisms and plankton. Key components of their diet in the Columbia River Estuary include *Corophium* spp., copepods and cladocerans of the genus *Daphnia*. Animals which prey upon this species include sturgeon, adult salmon, harbor seals, and piscivorous birds.

- Starry Flounder. The starry flounder is a marine flatfish moderately important to the Pacific coast trawl fishery. It is also a fairly important sport fish for anglers.

Starry flounder can tolerate a wide range of salinities, with young flounder preferring low salinities while older flounder prefer high salinities. The species spawns in the ocean, but juveniles are found almost exclusively in estuaries. Juvenile starry flounder are very abundant near South Tongue Point. Both juveniles and adults are demersal (bottom-oriented) carnivores that prefer soft bottom types. They eat benthic organisms that include *Corophium salmonis*, other species of amphipods, copepods, polychaetes, bivalves, and occasionally fish. Flounder are eaten by birds and marine mammals.

- Pacific Staghorn Sculpin. The staghorn sculpin is a marine demersal species that can tolerate fresh and brackish water. Juveniles tend to be found in shallow water, while adults tend to inhabit deeper, more saline waters. Staghorn sculpin are abundant in both deep and shallow water near South Tongue Point.

Staghorn sculpin juveniles and adults are benthic carnivores which eat *Corophium salmonis*, *Eogammarus* amphipods, *Crangon* shrimp, polychaetes, and an occasional small fish.

- Prickly Sculpin. The prickly sculpin is a freshwater species that is tolerant of mildly brackish water but apparently intolerant of strongly saline water. It is a demersal carnivore with food habits which are similar to those of staghorn sculpin where the two species are found together in the estuary. Prickly sculpin juveniles and adults are very abundant at South Tongue Point and elsewhere within upper portions of the Columbia River Estuary.

- Largescale sucker. The largescale sucker is a bottom-oriented freshwater species that is somewhat tolerant of mildly brackish water conditions. It is common at South Tongue Point and has food habits that would classify it as a benthic omnivore. Large juvenile and adult suckers residing near the project site may be



an important prey item for eagles and other raptors foraging in western Cathlamet Bay.

- Peamouth. The peamouth is a relatively small freshwater cyprinid (belonging to the carp family of fishes) that is present in the upper Columbia River Estuary and rather abundant near South Tongue Point. It prefers slow moving water and will concentrate in shallow areas where aquatic vegetation is present (Simpson and Wallace, 1978). Peamouth spawn over gravel or rubble substrates to which their adhesive eggs will stick. This would preclude their spawning in the estuary near South Tongue Point.

Peamouth are opportunistic predators which feed on small crustaceans, aquatic insect larvae, amphipods, and terrestrial insects. Within the Columbia River Estuary, they are probably eaten by raptors and predatory fishes.

### Reptiles and Amphibians

Amphibians at South Tongue Point are expected to be common species typical of densely vegetated coastal areas, with diversity somewhat restricted due to the brackish conditions. The reptiles at South Tongue Point are expected to be largely restricted to moisture-tolerant species such as garter snakes. A list of expected and observed reptiles and amphibians at South Tongue Point is included as Table 6 of Appendix B.

### Birds

A study of the avifauna of the Columbia River Estuary (Jones & Stokes Associates, Inc., 1984) investigated key avian species and habitats in the project vicinity. Eighteen key species were selected for the one-year study: western grebe, double-crested cormorant, pelagic cormorant, great blue heron, mallard, American widgeon, surf scoter, common merganser, bald eagle, red-tailed hawk, dunlin, sanderling, western sandpiper, western gull, glaucous-winged gull, common murre, common crow, and black-capped chickadee. The key species were chosen using the following criteria:

1. Abundance within the estuary (common to very common);
2. Population status (endangered, threatened, or declining);
3. Importance of the species to the overall estuary ecosystem;
4. Recreational value of the species; and
5. Importance of the Columbia River Estuary to the species (e.g., critical nesting or feeding sites).

Seven key habitat types were studied: open water, mudflat, marsh, marsh-shrub, tree-shrub, and forest. All seven of these habitats are found on or in the vicinity of South Tongue Point.

Some of the pertinent findings of the study were:

- The open water habitat in the vicinity of the Lower Columbia River Estuary is important to wintering western grebes, probably in response to concentrations of longfin smelt and Pacific herring.
- Areas near North and South Tongue Point are important for double-crested cormorants throughout the year, possibly because of seasonal concentrations of longfin smelt, Pacific herring, starry flounder, and coho salmon.
- Pelagic cormorants are less abundant than double-crested cormorants; however, one of the several areas in which they are most numerous was adjacent to South Tongue Point.
- Bald eagles use open water, mudflat, and marsh habitats as foraging grounds (see Threatened, Endangered, and Sensitive Species discussion below).
- Red-tailed hawks occur in low numbers throughout the estuary.
- Great blue herons are abundant and ubiquitous during all seasons. The nearest rookery to South Tongue Point is located at Karlson Island, approximately 10 miles to the east.
- Shorebirds occur in mudflat and marsh habitats throughout the estuary during spring, summer, and fall.
- Common crows are numerous during all seasons, using all habitat types.
- Black-capped chickadees are year-round residents in shrub and forested habitats.
- Most of the eagle nests in the estuary are located in coniferous forest areas adjacent to the estuary on both the Oregon and Washington sides of the estuary.

The study concluded that none of the key bird species is dependent solely on the Columbia River Estuary for its existence; however, the area is important for wintering and migratory waterfowl, grebes, and shorebirds. It supplies important year-round habitat for gulls, crows, chickadees, eagles, and herons. Of the available habitats, mudflats were the least important to key species and numerically dominant species.

In addition to the key avian species used for the study discussed above, other species are present in the project area. Dabbling ducks such as the mallard, pintail, and green-winged teal are common, as are diving ducks such as scaup, canvasback, goldeneye, bufflehead, and ruddy ducks. Other waterbirds frequently sighted in the area include scoters, coot, western grebe,

wood duck, and tundra swan. Ospreys and kingfishers were observed during a bald eagle study conducted during the summer of 1991 (David Evans and Associates, Inc., 1991c). Many additional species of passerines, including woodpeckers, flycatchers, swallows, wrens, kinglets, warblers, finches, and sparrows are year-round or summer breeding residents.

A list of expected and observed bird species at South Tongue Point is included as Table 7 of Appendix B.

### Mammals

Marine mammals commonly occur in the Lower Columbia River Estuary, with harbor seals, California sea lions, and northern sea lions the principal species. Harbor seals are reported to use islands and mudflats in Cathlamet Bay (Corps, 1987), although this area is less important to the harbor seal than Desdemona Sands and Taylor Sands.

Nutria, muskrat, and raccoon occur relatively frequently in the wetland habitat of South Tongue Point, and beaver and river otter may occasionally occur. Black-tailed deer are common in the area, and a number of small mammals such as voles, shrews, and mice are expected to be common as well.

A list of expected and observed mammal species at South Tongue Point is included as Table 8 of Appendix B.

## **B. Threatened, Endangered, and Sensitive Wildlife Species**

### Salmonids

Three species of fish that are Federally protected may use aquatic habitat at the project site on a seasonal and probably infrequent basis. These fish include three stocks of Snake River salmon:

1. Sockeye, Federally listed as Endangered (National Marine Fisheries Service., 1991);
2. Fall chinook, Federally listed as Threatened; and
3. Spring/summer chinook, also Federally listed as Threatened.

The Snake River sockeye and spring/summer chinook are not likely to utilize rearing habitat near South Tongue Point to any significant degree because juveniles of these stocks move quickly downstream through the Columbia River Estuary via the main river channels (Dawley et al., 1982; Bottom et al., 1984; Dawley et al., 1986). Snake River fall chinook, however, may use rearing habitat (intertidal and shallow subtidal habitat) at South Tongue Point because they migrate downriver as subyearlings. As a group, subyearling chinook produced upstream in the Columbia River drainage use rearing habitat like that found at South Tongue Point and in other

areas of the estuary more extensively than any other anadromous salmonids (Olhausen, 1980; Cates, 1983; Bottom et al., 1984; Fox et al., 1984); however, none of these salmonids are expected to be found in any significant numbers in the area.

Dawley et al. (1982) found the rate at which subyearling chinook migrate through the upper Columbia River Estuary to be related to the distance traveled to reach the estuary. The farther that the subyearling chinook had traveled prior to reaching the upper estuary, the quicker they passed through toward the ocean. This does not necessarily mean that Snake River fall chinook, which travel a considerable distance to reach the Columbia River Estuary, do not require good rearing conditions if they happen to pass through areas like South Tongue Point. Rather, it suggests that they may not need to rest for an extended period of time in the upper estuary prior to entering the ocean. It might also mean that poor migratory conditions (impoundments, limited food availability, warm water temperatures, etc.) upstream have so delayed these fish that their primary concern is reaching the ocean as quickly as possible, regardless of feeding opportunities in western Cathlamet Bay or elsewhere.

Recent and historic declines in the numbers of Snake River sockeye, fall chinook, and spring/summer chinook have been attributed to a number of factors. These include hydroelectric development, hatchery practices, and degradation of freshwater habitat upstream of the Columbia River Estuary. Historic changes which may have occurred in the estuary have not generally been considered a significant factor contributing to the declining numbers of these stocks.

#### Columbian White-Tailed Deer

The Columbian white-tailed deer (*Odocoileus virginianus leucurus*) is one of 38 recognized subspecies of *virginianus*, a species with a continuous geographic distribution that includes most of the continental United States. The Columbian white-tailed deer prefers lowland and riparian habitat. Federal recognition of the Columbian white-tailed deer as Endangered came in 1967. Loss of habitat and unregulated hunting are evidently the main causes of the deer's population decline.

The *Revised Columbian White-tailed Deer Recovery Plan* (Service, 1983), describes the recognized Columbia River population as occurring approximately 14 river miles east of South Tongue Point, from Wallace Island (located at RM 50) downstream to Karlson Island (RM 32). South Tongue Point is located at RM 18. The Recovery Plan is presently the only data available on the status of the Columbian white-tailed deer from the U.S. Fish and Wildlife Service Portland Field Office. Incidental sightings are noted to have occurred in the project vicinity, but there are no confirmed sightings recorded outside of the known population range, and South Tongue Point is not believed to be part of the range of the Columbian white-tailed deer. Black-tailed deer, however, are common on South Tongue Point.



## Bald Eagle

The following discussion of bald eagles (*Haliaeetus leucocephalus*) in the vicinity of South Tongue Point is based on existing literature published on the results of studies beginning in September of 1984 (Watson and Anthony, 1985), and continuing through the decade (Watson and Anthony, 1986; Bottorff et al., 1987; Garrett et al., 1988; Ingels, 1989; Bruner and Isaacs, 1990; McGarigal et al., 1991) to the present time (David Evans and Associates, Inc., 1991b and 1991c). Experts have also been contacted to obtain the most recent unpublished information regarding bald eagles in the project area (Isaacs, pers. comm., November 5, 1991). These studies contain abundant technical data supporting the points made in the following general discussion.

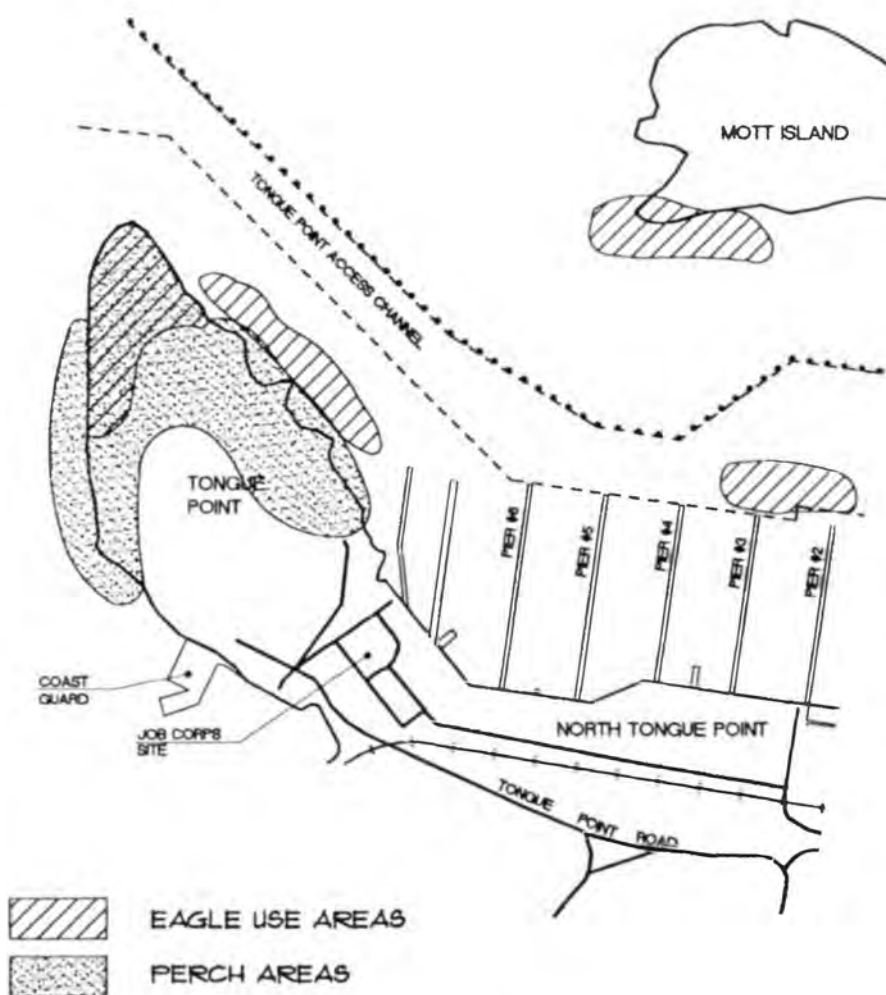
Bald eagles are protected by the Federal Endangered Species Act of 1973 as a Threatened species. Bald eagles are diurnal, and feed largely on carrion and fish. Bald eagles are found throughout North America, always in close association with coastal waters and inland lakes and rivers. Although migrating and wintering bald eagles occur in most states, breeding populations are restricted to a few geographic areas, including the Pacific Northwest. Habitat loss from human disturbance (logging, recreation, and shoreline development), as well as environmental contaminants which cause reproductive failure are the main reasons for the decline in bald eagle populations (Service, 1982).

The Lower Columbia River Estuary includes a complex of islands, tidal mudflats, marshes, and forested uplands that provide important habitat for bald eagles. The lower portion of the Columbia River supports both permanent resident eagles (32 breeding pairs -- 17 on the Washington side and 15 on the Oregon side), and seasonal visitor eagles (non-breeding or wintering). As discussed below, the project site and its vicinity contribute foraging and perching habitat for bald eagles (Figure 3-12).

A permanent bald eagle nest site location on Mill Creek approximately one mile from South Tongue Point has been known since 1974 and has been monitored annually with nesting outcome determined since 1980 (Isaacs and Anthony, 1991). Another study of bald eagle activity in the project vicinity was begun in September 1984 and continued through January 1985 (Watson and Anthony, 1985). This Mill Creek nest site continues to be used by a pair of bald eagles known as the Mill Creek pair. The Mill Creek pair was noted during the study to use the general vicinity of North and South Tongue Points as a primary feeding area, including the mouth of Mill Creek, John Day Point, and Mott Island. Further, the study indicated that several of the primary perches used by the Mill Creek pair were located on the northeast and extreme southeast sides of South Tongue Point. Foraging for this pair was observed to be highest in the tidal area between North and South Tongue Points, with some activity occurring on the tidal flats at the entrance to the John Day River.

Results from a more extensive continuation of the 1985 study was published in January 1986 by the same authors (Watson and Anthony, 1986). This study dealt with both the Mill Creek pair

SOURCE: INGELS, 1989  
BRUNER & ISAACS, 1990



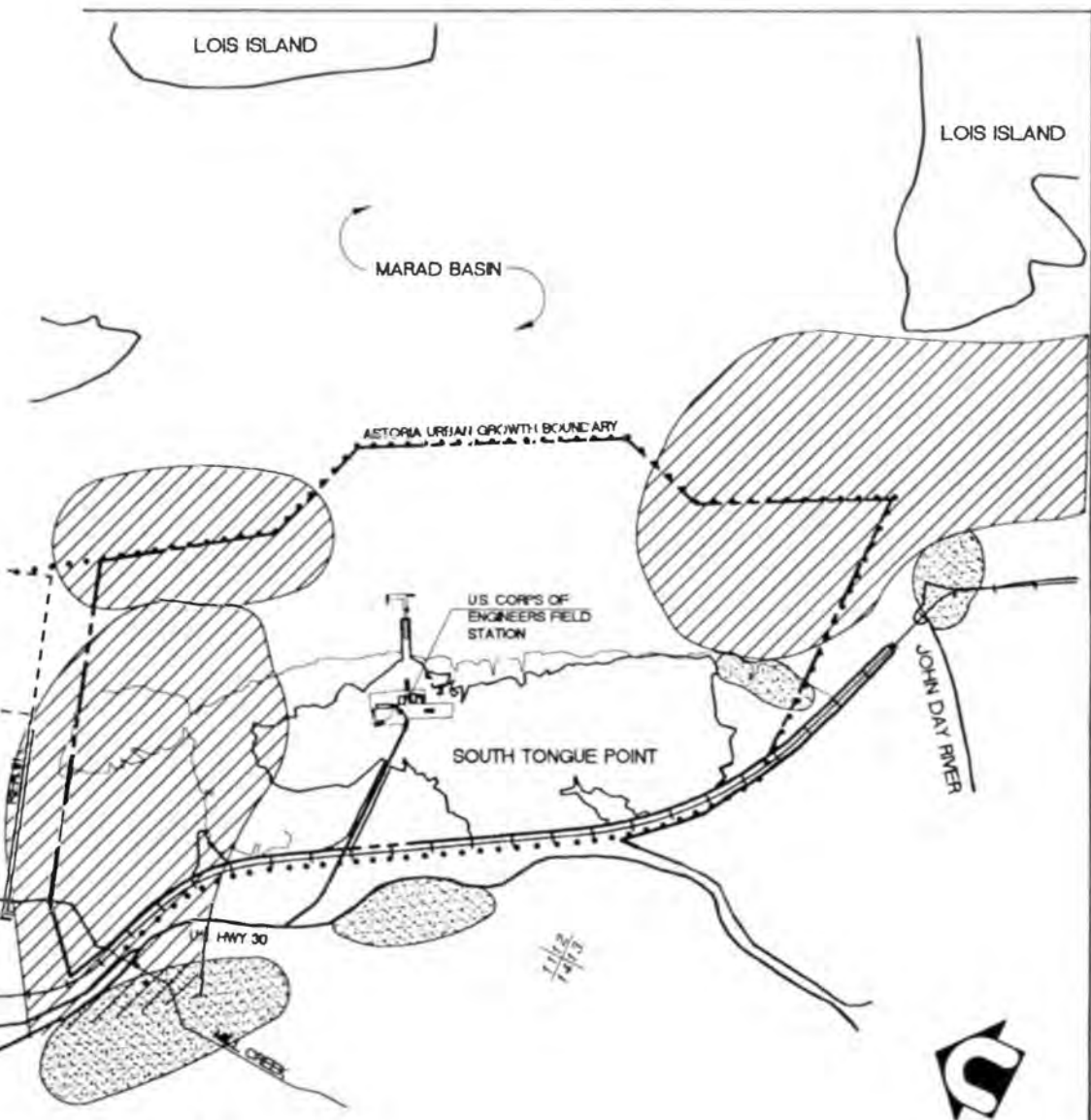


Figure 3-12  
**AREAS OF BALD EAGLE USE  
 ADJACENT TO SOUTH TONGUE POINT**  
 SOUTH TONGUE POINT EIS

and another breeding pair with a nest site located approximately 2.5 miles from South Tongue Point, known as the Twilight Creek pair. (This name is somewhat misleading in that the actual name of the creek on which the nest is located is Eskeline Creek; the Twilight name comes from a logging road that leads to the nest site [Barnes, 1991a]). The study found that the adult eagles preferred stands of old-growth conifers for nesting, roosting, and foraging perches, and generally avoided residential and industrial areas. Tidal flats were important foraging habitats for the eagles, with live fish the primary prey. Foraging times were reported to be concentrated in the morning and at low tides, consistent with the literature for many other locations, though foraging is known to occur in the evenings also. The study found that the home ranges of the Mill Creek and the Twilight Creek pairs overlap at the southern end of South Tongue Point. (Note: the term "home range" and "breeding territory" define two different areas and uses. Home ranges are the areas where eagles actively forage. Territories are the areas that eagles actively defend, often through aggressive displays, and are generally centered around the nest site. Home ranges may overlap, but the breeding territories seldom do. The size of home ranges and the degree to which they overlap also varies with the season, with more overlap and interactions in the winter than in the summer [Vorderstrasse, 1991]).

The Watson and Anthony (1986) study observed that the Mill Creek breeding pair had an unusually high tolerance for motor vehicle and train activity, and moderate tolerance of pedestrians passing 25 meters below perches. This eagle pair had a low tolerance for moving boats and anchored vessels in the Mill Creek embayment, but tolerated boats using the waters off of North Tongue Point. Tolerance levels were based on disturbances within 100 meters of eagles perched on elevated structures such as a tree or piling. Low tolerances were defined as causing the eagle to leave the area, and high tolerances allowed the eagle to remain perched (Watson and Anthony, 1986).

The Watson and Anthony (1986) study also investigated the status of seasonal non-breeding eagles in the South Tongue Point area. The only known communal eagle roost on the lower portion of the Columbia River was located during this study on Marys Creek, adjacent to the territory of the Twilight Creek pair. Both wintering and resident eagles also use other perch and roost sites throughout the Lower Columbia River Estuary (Vorderstrasse, 1991). The study found that wintering eagles arrive in the area in November, peak in mid-March (the study counted a maximum of 28 eagles), and are usually gone by April. The tidal flats were also noted to be important foraging habitat for these wintering eagles, especially east of Lois Island but also including the wetlands at the mouth of Mill Creek. Scavenged fish is the main food source for the wintering birds. Subadult eagles constitute most of the visiting population, and some immature birds are present throughout the year.

An additional study (Garrett et al., 1988) identified both North and South Tongue Points as valuable eagle habitat. South Tongue Point is important because of its proximity to the mouth of Mill Creek, an area heavily used by foraging eagles. South Tongue Point was also identified as important because of the fact that perches of balsam cottonwood, identified as important



hunting perches for resident and wintering eagles, are located at the southern end of South Tongue Point.

The Mill Creek nest is described in the 1988 (Garrett et al.) study as being located in higher quality habitat than many other nest sites along the Lower Columbia River (Garrett et al., 1988). The Mill Creek pair has had a moderate success rate in raising young, with one young fledged each year from 1982 through 1987 (excepting 1984), for a reproductive success rate of 80 percent to that date. However, for the decade of 1980 to 1991, the success rate dropped to 50 percent (Vorderstrasse, 1991). For a period from 1980 to 1987, bald eagle productivity on the entire lower portion of the Columbia River averaged 0.57 young per occupied nest, with only 37 percent of the occupied breeding territories successful in fledging young.

The 1988 (Garrett et al.) study concluded that significant eggshell thinning and low reproductive success in the bald eagle population in the lower portion of the Columbia River is associated with high concentrations of DDE. In a Service report (Ingels, 1989), results from an analysis of limited fish collections from the lower portion of the Columbia River showed PCB concentrations ranging from not detectable to 0.52 parts per million (ppm), exceeding Environmental Protection Agency guidelines. The greatest area of concentration for both PCB and DDE were from fish collected from the vicinity of North Tongue Point.

The 1988 (Garrett et al.) study also identified areas of heavy use and key perch areas for the Mill Creek pair. The Mill Creek embayment, including the northern tip of South Tongue Point, is identified as an important eagle use area, as is the mouth of the John Day River. Perches are shown on the extreme southeastern corner of South Tongue Point and on John Day Point across the John Day River.

A study completed in 1990 (Bruner and Isaacs, 1990) described the results of a mitigation program for channel dredging and the monitoring of eagles during the mitigation and dredging process. The report concluded that supplemental food (American shad) was not used by the Cathlamet Bay eagles, possibly because the dredging project did not impact the availability of natural food, or because of human disturbance associated with the placement of the food. The authors also conjectured that the dredging may have changed the eagle activity patterns from those observed during the earlier studies discussed above.

During the spring of 1991, local experts observed a feathered eaglet in the Mill Creek nest (David Evans and Associates, Inc., 1991b). The eaglet was noted during a helicopter survey on June 25, 1991 and again when the nest was checked on July 16, 1991 (Isaacs, pers. comm., November 5, 1991). The eaglet was observed to be ready or nearly ready to leave the nest at that time, but observations of the nest did not continue past that time, so the success of the fledging in leaving the nest is unknown (Isaacs, pers. comm., November 5, 1991).

In 1991, the Twilight Creek pair moved their nest site to a stand of protected old growth trees approximately 0.5 mile from their previous nest site and successfully fledged two eaglets. An

unusual aspect of this move and successful reproduction is that the new nest site is closer to existing sources of human disturbance (two highways and the railroad) than the old nest; however, the habitat surrounding the nest site is significantly better because it includes a stand of uncut timber, and other nest site opportunities are very limited (Isaacs, pers. comm., November 5, 1991).

A monograph published in 1991 (McGarigal et al., 1991), included the results of a study conducted during the spring and summer of 1985 and 1986 in the Lower Columbia River Estuary. This study was designed to document the effects of human activities on foraging eagles during the breeding season. The study distinguished between two types of interaction. The first involved a moving human approaching a stationary eagle and inducing a disturbance. This form of interaction, which is relatively infrequent in the estuary, accounted for a minor proportion of an eagle's time-energy budget. Only 20 percent of all moving human activities observed during this study resulted in human-eagle encounters within 500 meters, and less than six percent of all encounters resulted in a visible disturbance to the eagle.

In the second form of interaction, the authors (McGarigal et al., 1991) studied six pairs of bald eagles for two years throughout the breeding season. These eagles had a choice of alternative foraging sites, some of which had human activities (usually a stationary boat) purposefully located nearby. According to the authors, stationary boats constitute the majority of human-eagle interaction in the Lower Columbia River Estuary. The authors found that, on the Lower Columbia River Estuary, stationary boat activities greatly outnumber all other types of human activities in eagle foraging areas, and that eagles rarely encountered moving boats and other human activities at distances that caused the eagles to leave the area.

The study (McGarigal et al., 1991) concluded that eagles foraging during the nesting season will typically avoid an area within 990 to 1,320 feet of an experimental disturbance (stationary boat), although the avoidance area ranged between 660 to 2,970 feet. In most cases observed during the study, eagles spent less time and made fewer foraging attempts in the area when human activities were present. Responses were consistent throughout the nesting stages, although foraging activity increased dramatically during the later nesting stages.

Although the authors (McGarigal et al., 1991) could not decisively conclude that the human activities were directly responsible for current eagle spatial use patterns in the Lower Columbia River Estuary, the results of the experimental disturbances confirmed that boating activities have the potential to affect eagle spatial use patterns. This led the authors to recommend 400-meter-wide buffer zones around high-use foraging areas, especially during the nesting and post-fledgling stages. Buffer zones of this width would protect more than 95 percent of all eagles from being flushed by moving boats and at least 50 percent of all resident eagles from the effects of stationary boats in or near high-use foraging areas. The authors suggest that the buffer zones be expanded to 800 meters wide on a site-specific basis to protect sensitive pairs or sensitive foraging areas (McGarigal et al., 1991).

An earlier study in Washington (Bottorff et al., 1987) examined the impacts of noise on bald eagles. Specifically, the study measured the decibels of noise in the normal background of an area known to be used by eagles for nesting and foraging. This data was compared to the noise level generated by pile driving for the rebuilding of ferry facilities at the Orcas and Shaw Island terminals during the winter and following spring of 1987, combined with observations of bald eagle behavior. There are no known standards for acceptable noise levels for bald eagles, although U.S. Environmental Protection Agency findings indicate that a decibel level of 85 is required to scare birds (species unknown) (Bottorff et al., 1987). The study concluded that, at a distance of 0.25 to 0.5 mile, the noise generated during construction work was similar to background noise, and, with a single exception, had no visible effect on eagle behavior.

In August 1991, the Corps granted a Nationwide Permit to the Division to perform geotechnical tests on the project site. In order to obtain this permit, a Biological Assessment to determine the possible impacts on bald eagles was completed (David Evans and Associates, Inc., 1991b). A condition of that permit was that bald eagle activity be monitored during the work period by a biologist experienced in observing the Mill Creek pair in order to determine that the project activities did not adversely affect young bald eagles that had recently fledged. The monitoring area consisted of the MARAD Basin, North Tongue Point, South Tongue Point, Mill Creek mudflats, John Day Point, and Mott and Lois Islands. When possible, monitoring included the morning low tide to observe tidal foraging.

The Mill Creek pair was initially monitored from approximately 8:00 AM to 5:00 PM for approximately two weeks. Because of an absence of bald eagle activity in the area, this schedule was then modified to two hours each morning (one hour prior to beginning of the geotechnical work and one hour during the work), one hour each mid-day, and one hour in the afternoon for one month on each day of the drilling activity (August 13 to September 16, 1991). Noise measurements were also taken. Weather conditions and time of low tide varied greatly during the monitoring period. Bald eagles were observed outside of the South Tongue Point area on 12 of the 18 monitoring days; however, bald eagles were not observed to use the project area during the monitoring period, even in the early morning hours before the geotechnical work began (David Evans and Associates, Inc., 1991c), a period of time historically preferred by the Mill Creek pair for foraging (Garrett et al., 1988). It was not possible to determine if bald eagles were avoiding the project area because of the geotechnical work or for other reasons (David Evans and Associates, Inc., 1991c). Other bird species, such as barn swallows, osprey, kingfisher (a single individual), great blue herons, Caspian terns, and cormorants appeared to be undisturbed by the work (David Evans and Associates, Inc., 1991c).

#### American Peregrine Falcon

The American peregrine falcon (*Falco peregrinus anatum*) is a Federally listed Endangered species that migrates through the project area. There are no known nests or other critical habitat in the project vicinity.



## Brown Pelican

The brown pelican (*Pelecanus occidentalis*), also a State and Federally listed Endangered species, has been mentioned as a potential species of concern at South Tongue Point. Brown pelicans are relatively common on the lower 10 miles of the Columbia River Estuary, and have been observed as far upstream as RM 13 (Barnes, 1991a). South Tongue Point is at RM 18. A number of studies and surveys (Hazel et al., 1984; Corps, 1987; Ingels, 1989) did not include a single observation of this species.

### **3.1.3 CULTURAL AND SOCIAL ENVIRONMENT**

#### **3.1.3.1 Land Use**

##### **A. Local Setting**

South Tongue Point is located east of Astoria in unincorporated Clatsop County and within Astoria's Urban Growth Boundary. The neighborhood is characterized by a wide variety of uses, including marine industrial, rural residential, residential, and public service facilities. Off-site land uses in the vicinity of the site include the existing industrial development at North Tongue Point. This area is a former Naval Base, now owned by the U.S. Department of Labor, which operates a Jobs Corps Center, and the Division, which leases land to several parties engaged in manufacturing and marine support businesses. Approximately four single family residences are located on the east side of U.S. Highway 30. The rural residential properties are in unincorporated Clatsop County and outside of the Urban Growth Boundary.

Within the incorporated area of the City of Astoria, located to the west of South Tongue Point, the major residential development is Emerald Heights, a housing complex originally built to house Navy personnel working at the former Tongue Point Naval Base. This development contains roughly 10 percent of Astoria's housing stock, and is operated by the County. Approximately 80 percent of the units are rented to families of low to moderate income. The other main residential area in the vicinity of South Tongue Point is the Alderbrook neighborhood which contains older single family homes.

The Refuge is located east of South Tongue Point. The Refuge was established in 1972 to preserve the estuary land and water as fish and wildlife habitat. The Refuge presently contains 38,000 acres of islands, mudflats, tidal marshes, and uplands. The estuary provides important habitat for migrating and nesting waterfowl, as well as many other species of birds, fish, and other animals.

##### **B. Comprehensive Plan and Zoning Designations**

In 1981, the CREST Mediation Panel Agreement provided a consensus agreement for water-dependent development at seven sites in Warrenton and Astoria. Participants in the Mediation



Panel Agreement included local, State, Federal, and regional agencies. The Mediation Panel Agreement identified two mutually exclusive development options at South Tongue Point -- water-dependent or non-water-dependent. The Mediation Panel Agreement also identified the need for goal exceptions to Statewide Planning Goal 16 (Estuarine Resources) for the water-dependent option. The Astoria Comprehensive Plan was amended in 1981 to incorporate the Mediation Panel Agreement and take necessary goal exceptions. In 1991, the Comprehensive Plan was amended to allow a mixture of water-dependent and non-water-dependent uses at South Tongue Point.

South Tongue Point is subject to the terms of a Joint Management Agreement between the City of Astoria and Clatsop County for areas available for urban uses. The Agreement gives the Astoria Planning Commission authority for land use requests in the urban area. Appeals of Planning Commission decisions inside the Urban Growth Boundary are made to the Clatsop County Board of Commissioners.

The Astoria Comprehensive Plan requires the annexation of South Tongue Point in order to extend urban services (including sanitary sewer) to the site. A petition requesting the annexation of South Tongue Point will be submitted to the City of Astoria for approval. When the site is annexed, decision-making authority will be entirely with the City of Astoria.

The South Tongue Point site includes the following Comprehensive Plan and Zoning designations (Figure 3-13). These designations allow a mixture of water-dependent and non-water-dependent uses:

#### Development Aquatic (A-1)

This area includes the tidal flats, marshes and wetlands on the east side of South Tongue Point. Permitted uses include: water-dependent commercial or industrial uses, navigational structures, dredging and filling, and piling. An exception for Goal 16 (Estuarine Resources) was taken to allow pile-supported structures across the intertidal flats, marshes, and wetlands.

#### Conservation Aquatic (A-3)

This area includes the water area to the east of the A-1 zone and inside the Urban Growth Boundary. This area includes a designated navigation channel. Permitted uses include: piling and pile-supported structures.

#### Natural Aquatic (A-4)

This area includes the subtidal and intertidal area between the northern end of South Tongue Point and the finger piers at North Tongue Point, the wetland area south of the Corps causeway, and the area at the southern end of South Tongue Point. Permitted uses include: low-intensity water-dependent recreation and passive restoration. Exceptions to Goal 16 were taken for fill



and road construction adjacent to and east of the Burlington Northern Railroad line for an access road between North and South Tongue Point.

#### Water Dependent Development Shoreland (S-1)

This area includes the upland areas of South Tongue Point with water access. Permitted uses include: water-dependent industrial and commercial uses, and water-related industrial and commercial uses. An exception to Goal 16 was taken for limited wetland fill for water-dependent development uses and an internal road system.

A conditional use permit to allow a U.S. Navy homeport facility at South Tongue Point was approved by the Astoria Planning Commission on October 23, 1991.

#### General Development Shoreland (S-2)

This area includes the upland areas not included in the S-1 zone, and without water access. Permitted uses include: water-dependent and non-water-dependent industrial, commercial and recreational uses.

### **C. Existing Uses**

The existing on-site improvements include the Corps Astoria Field Station. The Field Station includes a small office building, a maintenance garage and shop, storage buildings, surface parking lot, and pier. An 18-foot-wide paved road provides access to the subject property. West of the railroad line, access to U.S. Highway 30 is provided by a public right-of-way. The Burlington Northern Railroad track forms the subject property's western boundary.

The balance of the uplands on the subject property (approximately 73 acres) are wooded and undeveloped. The wetland areas, which surround the uplands, are in a natural and undeveloped condition.

#### **3.1.3.2      Socioeconomic**

### **A. Population**

#### Clatsop County

An appraisal report completed for the South Tongue Point project area (Powell, Goss & Associates, 1990) and a housing study completed for the U.S. Navy (Johnson and Knapp, 1991) described the population of Clatsop County as being distributed over six cities and a large unincorporated area. The largest city is Astoria, followed by Seaside, Warrenton, Cannon Beach, and Gearhart. The cities of Hammond and Warrenton merged on December 5, 1991, and the city is now called Warrenton.



Table 3-4 summarizes the population distribution of Clatsop County. It also indicates percentage changes in population for the previous 20 years. These changes are due in large part to an emigration of working people that took place during the economic recession that occurred between 1980 and 1985. Some of the smaller coastal communities have experienced significant growth during the last 20 years. The population of Seaside increased 22 percent between 1970 and 1990. Cannon Beach grew by 56 percent over the same time period. This growth is in large part due to an immigration of retirees (Powell, Goss & Associates, 1990; Johnson and Knapp, 1991).

A comparison of Clatsop County and State census data for 1990 shows the age distribution in the County to be fairly similar to the distribution in the State as a whole. However, older persons (65+) account for a greater proportion of the population in Clatsop County than in the State, and those aged 25 to 54 constitute a smaller proportion. The older population (65+) increased from 14.6 to 16.2 percent in Clatsop County between 1980 and 1990, compared to an increase of 11.5 to 13.8 percent in the State as a whole. In 1990, the 25 to 54 age group constituted 40.7 percent of Clatsop County's population, as compared to 43.0 percent in the State as a whole. This slight skew in Clatsop County's age distribution is due to two factors: (1) the continuing attraction of the Oregon coastal communities for retirees, and (2) the loss of employment opportunities (especially in lumber, wood products, and fishing industries) (Johnson and Knapp, 1991).

#### City of Astoria

The population of Astoria has remained fairly even over the past 20 years (1970 to 1990). The last significant change in population occurred between 1960 and 1970, when the population fell from 11,239 (1960) to 10,244 (1970), which represented a decrease of 8.9 percent (Johnson and Knapp, 1991). This is due in large part to a decline in the wood products and fishing industries, combined with the effects of a national recession in the early 1980s. The City is now beginning to build a population of levels similar to those of 1980 (Powell, Goss & Associates, 1990).

### **B. Employment**

#### Clatsop County

Table 3-5 represents total employment figures in Clatsop County for 1987 to 1989, as well as the percentage of change in the various industries over the past three years. In general, the Clatsop County economy has historically been dependant on the wood products, fishing, government, and tourism industries (Powell, Goss & Associates, 1990).



**TABLE 3-4**  
**CLATSOP COUNTY POPULATION DISTRIBUTION**

|                | <u>1970</u> | <u>1980</u> | <u>1990</u> | <u>% Change</u><br><u>1970/80</u> | <u>% Change</u><br><u>1980/90</u> |
|----------------|-------------|-------------|-------------|-----------------------------------|-----------------------------------|
| Oregon         | 2,091,533   | 2,633,156   | 2,842,321   | 25.9                              | 7.9                               |
| Clatsop County | 28,473      | 32,489      | 33,301      | 14.1                              | 2.5                               |
| Astoria        | 10,244      | 9,998       | 10,069      | -2.5                              | 0.7                               |
| Canon Beach    | 779         | 1,187       | 1,220       | 52.3                              | 2.8                               |
| Gearhart       | 829         | 967         | 1,027       | 16.6                              | 6.2                               |
| Hammond        | 500         | 516         | 589         | 3.2                               | 14.2                              |
| Seaside        | 4,402       | 5,193       | 5,359       | 18.0                              | 3.2                               |
| Warrenton      | 1,825       | 2,495       | 2,681       | 36.7                              | 7.5                               |
| Unincorporated | 9,894       | 12,135      | 12,356      | 22.7                              | 0.2                               |

Source: Powell, Goss & Associates, 1990; and Johnson and Knapp, 1991

Table 3-5 indicates that, during this three-year period, the greatest growth in employment occurred in the manufacture of durable goods. This growth was, in large part, due to module construction for the oil and aerospace industry. These contracts, which were completed in 1989, involved the movement of several hundred workers into the County. Few of the jobs associated with these contracts lasted longer than six months, and none could be considered permanent to the local economy (Powell, Goss & Associates, 1990).

Most of the other areas of employment grew moderately over the three-year period, except for construction, which declined over 50 percent between 1988 and 1989. This decline was most likely due to the completion of the James River Corporation expansion of the Wauna pulp plant in eastern Clatsop County (Powell, Goss & Associates, 1990).

The Clatsop County wood products industry experienced growth in the 1970s, but was impacted greatly by the recession in the early 1980s. At the same time that the area was recovering, the industry was streamlining. Plants that remained open changed to more automated, mechanized, and less labor-intensive operations. As a result, even though record timber harvests were recorded in the late 1980s, employment in the industry never recovered to pre-recession levels. Some of the loss of timber-related jobs has been mitigated by the rise of the pulp and paper industry, such as the Wauna expansion of the James River Corporation (Powell, Goss & Associates, 1990).

**TABLE 3-5**  
**CLATSOP COUNTY EMPLOYMENT**

|                                | <u>1987</u>   | <u>1988</u>   | <u>1989</u>   | <u>% Change<br/>1987-88</u> | <u>% Change<br/>1988-89</u> |
|--------------------------------|---------------|---------------|---------------|-----------------------------|-----------------------------|
| <b>Total Wage &amp; Salary</b> | <b>12,320</b> | <b>13,150</b> | <b>13,570</b> | <b>+6.7</b>                 | <b>+3.2</b>                 |
| <b>Manufacturing</b>           | <b>2,900</b>  | <b>3,190</b>  | <b>3,390</b>  | <b>+10.0</b>                | <b>+6.3</b>                 |
| Durable Goods                  | 910           | 1,040         | 1,190         | +14.3                       | +14.4                       |
| Lumber/Wood                    | 760           | 790           | 740           | +3.9                        | -6.8                        |
| Other                          | 150           | 250           | 450           | +66.7                       | +80.0                       |
| Nondurable Goods               | 1,990         | 2,150         | 2,200         | +8.0                        | +2.3                        |
| Food/Kindred                   | 820           | 900           | 900           | +9.8                        | N.C.                        |
| Paper/Allied                   | 1,060         | 1,140         | 1,190         | +7.6                        | +4.4                        |
| Other                          | 110           | 110           | 110           | N.C.                        | N.C.                        |
| <b>Non-Manufacturing</b>       | <b>9,420</b>  | <b>9,960</b>  | <b>10,180</b> | <b>+5.7</b>                 | <b>+2.2</b>                 |
| Construction                   | 430           | 630           | 400           | +46.5                       | -57.5                       |
| Transp/Comm/Util               | 570           | 550           | 540           | -3.6                        | -1.9                        |
| Trade                          | 3,400         | 3,650         | 3,950         | +7.4                        | +8.2                        |
| Finan/Ins/R.E.                 | 490           | 520           | 550           | +6.1                        | +5.8                        |
| Services                       | 2,390         | 2,490         | 2,600         | +4.2                        | +4.4                        |
| Government                     | 2,140         | 2,120         | 2,140         | -0.9                        | +0.9                        |

Source: Powell, Goss & Associates, November, 1990

The current debate of old-growth timber harvest may not have a strong impact on Clatsop County, because most of the forest holdings in the County are private or State lands, with little old growth timber. In August 1990, the Federal government banned log imports from all public lands in Oregon (Labor Market Information, 1990). However, although some economists feel that the log export ban constitutes a severe impact on the Port of Astoria (Powell, Goss & Associates, 1990), others feel that because logs will continue to leave the area for domestic mills elsewhere, and because the ban does not apply to timber harvested from private lands, the Astoria area will feel little impact (Labor Market Information, 1990).

In addition to the wood products industry, the fishing industry, government employment, and tourism are the other major job sources for Clatsop County. Government employment has remained fairly stable over the last decade; but the fishing industry has declined, with two major

fish processing plants closing permanently in the early 1980s. The fishing industry will continue to struggle as the wild Columbia River salmon species are protected under the Endangered Species Act (Labor Market Information, 1990). The move to ban drift net practices may impact seafood processing plants (Labor Market Information, 1990). Tourism has been a growth industry for Clatsop County, especially for the cities of Astoria, Seaside, and Cannon Beach. The growth of tourism has intensified problems caused by the shortage of affordable housing in the County and has limited the potential benefit to local employment. During the tourist season, workers are often bussed from the Portland area to the coast because of the shortage of local rental housing (Powell, Goss & Associates, 1990).

The 1989 unemployment rate for Clatsop County was 5.8 percent, down substantially from a 1982 high of 15.8 percent. Per capita income in the County for 1987 was \$13,771. The State of Oregon had a 1987 per capita income of \$14,018; the United States, \$15,484. The lower figure for Clatsop County reflects a high percentage of jobs in the lower-paying service sector, which are largely tourism-related (Powell, Goss & Associates, 1990).

Poverty is a problem in Clatsop County. A survey conducted between December 1, 1990 and May 31, 1991 (Clatsop Community Action, Inc., 1991) profiles the level of poverty in Clatsop County. The survey, which questioned 405 people using the Clatsop Community Action services, or other food bank services, found that food costs, low-paying jobs, or lack of employment, rent, utilities, lack of reliable transportation, and medical costs were the biggest problems. In 1990, 12.5 percent of Clatsop County residents were at or below the Federal poverty guideline, which is \$1,117 per month for a family of four. The average gross monthly income of the survey respondents was \$405 per month, or \$4,556 annually.

It is expected that the Clatsop County economy will continue to experience moderate growth in the service and trade sectors over the next few years. The outlook for the wood and paper products industries is less clear, and is dependent on governmental decisions regarding timber harvest quotas and log export bans (Powell, Goss & Associates, 1990).

### City of Astoria

The economy of the City of Astoria mirrors that of Clatsop County. Historically, the mainstays of the Astoria economy have been fishing and fish processing, as well as logging and wood products. Due to declining salmon populations, government-imposed catch limitations, and increased use of factory ships, the fishing and fish processing industries have experienced a substantial decline. The Barbey Seafood plant closed in 1981, and Bumblebee Seafood plant closed in 1982 (Powell, Goss & Associates, 1990). There are three remaining seafood processing plants in Astoria-- Ocean Foods, Bornstein, and Astoria Seafoods (Barnes, 1991a).

The City of Astoria, through its Community Development Office, has developed the Astoria Area Enterprise Zone in an effort to attract new industries to the area. This program offers tax incentives and development concessions to qualified companies willing to develop within the



Enterprise Zone. The Enterprise Zone encompasses most of the available industrial land in the Astoria area, including South Tongue Point (Powell, Goss & Associates, 1990).

### C. Housing

The 1970s represented a period of rapid growth throughout Oregon, with the State gaining 45 percent of its housing stock during that period. Clatsop County gained 4,111 units (33 percent) during that decade. However, unlike Clatsop County and most other cities within the County, Astoria's increase in housing stock was limited to 9.5 percent (Johnson and Knapp, 1991).

In contrast, additions to the State's housing stock in the 1980s were only 10 percent. Clatsop County was limited to 4.5 percent, and the City of Astoria may have lost units during this period. New units were limited to the construction of 168 units, 112 of which were specialized housing for the elderly (Johnson and Knapp, 1991).

Housing remains limited in Astoria, with a particular shortage of affordable rental housing. The average selling price of a home in Astoria in 1990 was \$50,000; the average rental in 1990 was \$400 per month (Powell, Goss & Associates, 1990). Astoria had a 1990 vacancy rate of 8.9 percent (Johnson and Knapp, 1991). Almost half of the Astoria housing occupancy in 1990 consisted of renters, a figure that was 10 percent higher than the State as a whole (Johnson and Knapp, 1991).

The City of Astoria will receive Federal Community Development Block Grant funds to provide low-cost loans to rental and home owners to rehabilitate their units. This effort will be concentrated in four Astoria neighborhoods that have significant areas of housing deterioration (Johnson and Knapp, 1991).

### D. Fiscal

The site is located in an unincorporated area of Clatsop County near the Astoria city limits. The County Assessor's tax code for the site is 1-02. According to the Assessor's Office staff, this tax code area includes nine governmental units which levy ad valorem property taxes. The taxing units and their levy rates in tax dollars per thousand dollars of assessed true cash value for the 1990-1991 fiscal year are as follows:

|                                              |         |
|----------------------------------------------|---------|
| Clatsop County . . . . .                     | 2.0734  |
| Port of Astoria . . . . .                    | 0.2751  |
| Ambulance Service District . . . . .         | 0.1615  |
| 4-H Extension District . . . . .             | 0.0630  |
| Clatsop Community College . . . . .          | 1.6232  |
| Clatsop Education Service District . . . . . | 1.4385  |
| Clatsop Care Center . . . . .                | 0.1791  |
| School District No. 1 . . . . .              | 15.7332 |

County Road District No. 1 . . . . . 0.9893

Combined Property Tax Rate . . . . . 22.5363

The area adjacent to the site west of the railroad track is in the John Day Rural Fire Protection District which had a 1990 tax rate of \$1.9186 and the John Day Water District which did not levy a property tax in 1990. The City of Astoria had a 1990 tax rate of \$10.9980. The combined tax rate for property within Astoria in 1990 was \$32.9766.

### 3.1.3.3 Cultural

#### A. Development of Site

An unpublished report (David Evans and Associates, Inc., 1991a) describes the recent creation of South Tongue Point as a land form. Hydrographic surveys prepared between 1922 and 1979 show that the South Tongue Point site east of the existing railroad embankment was an aquatic area, probably in a largely undisturbed natural condition up to March 1949 or later. Between March 1949 and November 1951, the MARAD Basin was dredged to about 20 feet MLLW and substantial fill was placed at the South Tongue Point site. Between February and July 1954 the basin was deepened to over 30 feet MLLW and additional fill was placed at the South Tongue Point site, creating the body of land existing today. Because it is a new land formation, little has occurred on South Tongue Point that could be termed cultural; however, limited cultural resources exist in the vicinity of the site. The following text discusses those resources.

#### B. Historic

The recent history of North Tongue Point is described in a report by Corbyn (1989). Corbyn notes that piers were constructed and channels dredged after the donation of this area by the citizens of Astoria to the Navy in 1921. In 1939, North Tongue Point became a seaplane base until 1944, and then a Navy air-training facility in 1946. In 1946, the Navy's Pacific Reserve Fleet was established at North Tongue Point. In describing previous uses of the site, Corbyn does not refer to these uses or their remains as historically significant.

Additional examination of the area is documented by Keeler (1981). Keeler reported that: *Cultural resources observed in the field and identified through the literature search consisted of buildings and structures comprising a part of the Tongue Point Naval Base, built in the late 1930's and 1940's.* Keeler does not describe the Corps site on South Tongue Point.

Corbyn (1989) also documents the partial construction of a fort on Tongue Point that was initiated in 1814. The fort was evidently never completed. Based on the descriptions in the report, the fort site appears to have been located on Tongue Point, north of the present Job Corps Center.

Corbyn quotes from the diary of Gabriel Franchere, a fur trader, with the following description of Tongue Point:

*This point, or perhaps one should better say this cape, extends for about ten or a dozen acres into the river and is abutted by a perpendicular rock, the summit of which must be 250 feet above the river level. This summit is covered by timber and many springs are to be found upon it.*

Although Corbyn did not find any specific information on the design or placement of the fort on Tongue Point, it is clear from this description that the fort was sited on North Tongue Point, not in any area adjacent to where South Tongue Point would be created.

Long-time local residents report that a railroad siding was located along the railroad tracks between the mouth of the John Day River and the present access road to the Corps Astoria Field Station. This siding included a bunkhouse on stilts over the water for the railroad gang and a small house for the boss. The siding was in existence by the 1920s, and was torn down sometime around the end of World War II. There is no evidence of the siding's existence today (Parker, pers. comm., December 27, 1991).

### C. Archaeological

Keeler (1981) also conducted an archaeological survey, including South Tongue Point in its entirety, and North Tongue Point south of Pier 6. Keeler states:

*The investigation consisted of a pedestrian examination of the exposed ground surface within the study area and a review of the pertinent archaeological, ethnographic and historical literature . . . . A single aboriginal archaeological site is officially recorded within the study area near the mouth of Mill Creek; but it probably was destroyed during construction of the Tongue Point Naval Base. No cultural materials were observed in the vicinity of the site, even at low tide. It must be noted, however, that it is possible for a limited field investigation to reveal no sign of an archaeological site which is buried by recent sediment or hidden by the sort of dense vegetation which covers much of the study area.*

For this study, test holes were dug along several pedestrian transects. No stratigraphy or cultural materials were revealed in these test holes. Although an aboriginal site was recorded at the mouth of Mill Creek (Site Form No. 35CLT54), no cultural material was located. Keeler asserts that the construction of the railroad or landfill and construction associated with the Tongue Point Naval Base probably destroyed the site. This statement concurs with an earlier investigation of the Mill Creek site (Minor, 1977).



#### **3.1.3.4      Visual Resources**

##### **A.      Views of the Site**

The existing visual character of South Tongue Point is best described by the vegetation types -- the deciduous uplands, the forested wetlands, and the shrub/scrub wetlands. With the exception of the Corps Astoria Field Station, the subject property is largely in a "natural" state. Describing the site as "natural" should be qualified since South Tongue Point was created out of dredge spoils only 40 years ago. Beachgrass was planted soon after placement of the dredge spoils, and today South Tongue Point supports dense vegetation.

The Corps Astoria Field Station, the only existing development at South Tongue Point, includes a small office building, a maintenance garage and shop, storage buildings, surface parking lot, and pier. The Field Station facilities are compact and use approximately six acres of the 30-acre Corps property.

The existing railroad track, although used infrequently, is also part of the character of the subject property.

##### **B.      Views from the Site**

The Columbia River, inclusive of Cathlamet Bay, the MARAD Basin, and Mott and Lois Islands have a strong visual presence from the easterly portion of the subject property--particularly from the existing pier.

#### **3.2      STATE-OWNED ISLANDS**

##### **3.2.1      PHYSICAL ENVIRONMENT**

###### **3.2.1.1      Project Location**

The Refuge lies within the estuary of the Columbia River in Clatsop County, Oregon. The Refuge contains some 20 named islands and unnamed sand bars, mud flats, tidal marshes, and wetland forests beginning 18 miles above the mouth of the Columbia River and extending upstream for 15 miles (Figure 3-14). The Refuge represents the largest protected estuarine wetland complex in western Oregon and is managed as a satellite of Willapa National Wildlife Refuge near Ilwaco, Washington.

The Service owns a small percentage of the Refuge's 38,000 acres. The majority of the Refuge is managed under cooperative agreements with the State of Oregon and Clatsop County for the State and County lands within the administrative boundary of the Refuge.

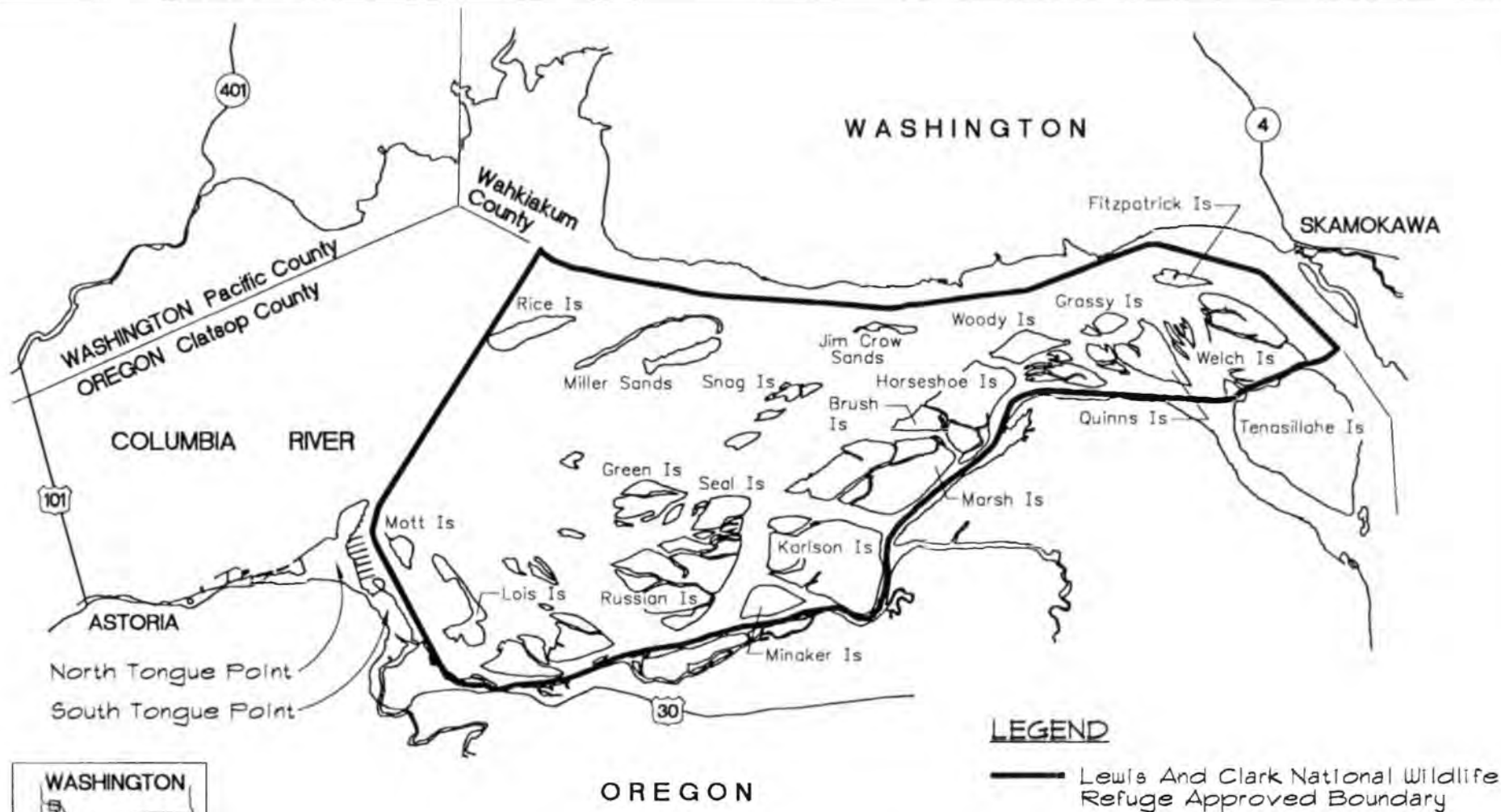


Figure 3 - 14  
ADMINISTRATIVE BOUNDARY OF  
LEWIS AND CLARK  
NATIONAL WILDLIFE REFUGE  
SOUTH TONGUE POINT EIS

June 19, 1992

The current acreage of the Refuge can be summarized as follows:

|                                                          |               |
|----------------------------------------------------------|---------------|
| Federal ownership, administered by the Service           | 2,851         |
| Service managed under agreement with the State of Oregon | 29,727        |
| Service managed under agreement with Clatsop County      | 4,300         |
| Other acreage - gift, other Federal agencies             | <u>1,222</u>  |
| <b>TOTAL ACRES</b>                                       | <b>38,000</b> |

### **3.2.1.2      Topography and Site Description**

As discussed in Chapter 2, a number of State-owned islands have been proposed for exchange between the State of Oregon and the Federal government. At this time the appraised valuation of the various proposed exchange lands have not been finally determined. Table 2-4 identifies State-owned lands within the administrative boundary of the Refuge and the priority in which the Service would wish to acquire these lands. Priorities are based upon habitat values and wildlife management potential.

#### **A.      Submerged Lands**

The lands identified in Table 2-4 are located within the Lower Columbia River Estuary in the area known as Cathlamet Bay. The estuary waters are essentially the same as described at South Tongue Point (Section 3.1.1.3 -- Topography and Site Description) and the water quality is essentially the same as described previously (Section 3.1.1.5 -- Hydraulics and Hydrology).

#### **B.      Wetlands**

Most of the lands identified in Table 2-4 are tidelands subject to the ebb and flow of the estuary waters. The extent of tidal flooding varies with the land elevation. These tidelands range from mud and sand flats largely devoid of macrophytic vegetation to substrates dominated by emergent vegetation (tidal marshes) to tidelands dominated by shrubs and trees (forested wetlands or tidal swamps).

#### **C.      Uplands**

The majority of the area composing Miller Sands, Rice Island, and Jim Crow Sands consists of dredge spoils deposited by the Corps. The main navigation channel is dredged on a regular basis and the resulting spoil materials deposited on designated islands. As part of the Corps dredge spoil stabilization program and the Service's wildlife habitat management program, the above dredge spoil islands have been seeded with grasses. Mott Island was created from dredge spoils deposited during the creation of the Marine Administration Basin, as was South Tongue Point (Section 3.1.1.1 -- Project Location and Vicinity Description).

### **3.2.1.3      Climate and Weather**

The climate within the Refuge is essentially identical to the conditions previously described for South Tongue Point (Section 3.1.1.2 -- Climate and Weather).

### **3.2.1.4      Soils and Sediments**

As the Columbia River nears the Pacific Ocean, the slowing current causes the river's sand and silt load to be deposited in the form of low islands and sand bars. Many of these features are constantly changing with the movements of the river. The main river channel is regularly dredged to maintain navigability and the resulting material is deposited on designated islands.

Miller Sands Island and Spit, Rice Island, Jim Crow Sands, and Mott Island are Tropopos-ammments and the remaining vegetated wetlands soils consist of the Coquille/Clatsop Complex (Section 3.1.1.4.A -- Soils).

### **3.2.1.5      Hazardous Materials**

The Service conducted a Level 1 Pre-acquisition Environmental Contaminant Survey for those islands proposed for exchange. The results of the survey do not indicate any apparent contaminant problem that could impact fish and wildlife or bring about any liability to the Service.

## **3.2.2    BIOLOGICAL ENVIRONMENT**

### **3.2.2.1      Wildlife Habitats**

The wildlife habitats represented by the potential exchange lands consist of upland dredge spoil grasslands, upland forest, tidal marshes, and tidal swamp (Service, 1990).

#### **A.      Spoil Island Grasslands**

Miller Sands Island and Spit, Rice Island, and Jim Crow Sands are islands largely created by the deposition of dredge spoils from channel maintenance work by the Corps. In 1978 the Service and the Corps initiated a grass seeding program on these islands. The Corps objective is to stabilize the spoil islands and reduce erosion of spoils into the navigation channel. The Service objective is to produce forage and cover for western Canada geese, nesting ducks, passerine birds, and other wildlife. Approximately 100 acres on Miller Sands Island, 80 acres on Rice Island and 50 acres on Jim Crow Sands have been seeded with a grass and legume seed mixture such as Timothy grass (*Phleum pratense*), orchard grass (*Dactylis glomerata*), red fescue (*Festuca rubra*), perennial rye grass (*Lolium perenne*) and white and red clover (*Trifolium repens* and *T. pratense*). About 70 rooted autumn olive shrubs (*Olea* sp.) were planted on two sites on



Rice Island and on one site on Jim Crow Sands with the assistance of the Soil Conservation Service.

#### **B. Tidal Marshes**

Except for Mott Island, the remaining vegetated potential exchange lands are tidal marshes. These islands are dominated by emergent vegetation such as slough sedge, Lyngbyei's sedge, softstem bulrush (*Scirpus validus*), tufted hairgrass (*Deschampsia caespitosa*), wapato, and rushes (*Juncus* spp.) and are largely flooded and exposed by tides twice a day. The tidal marsh plant communities are the result of the large volume of Columbia River freshwater entering the estuary in Cathlamet Bay. The tidal marshes are primarily freshwater plant communities due to the large volume of water from the Columbia River entering the estuary at Cathlamet Bay.

#### **C. Tidal Swamps**

On Mott Island, a narrow zone between the island's tidal marsh and upland forest is dominated by tidal swamp. This area is characterized by woody vegetation which is flooded and exposed by estuary waters. Shrub zones are dominated by Hooker's, pacific, and sitka willows. Forested areas are characterized by red alder with skunk cabbage common in the understory.

Miller Sands has approximately 72 acres of tidal swamp habitat, dominated by willows, balsam cottonwood, and red alder.

#### **D. Upland Forest**

The center of Mott Island is dominated by red alder, with grassland openings within the forest. The plant communities are very similar to those described for South Tongue Point (Section 3.1.2.1 -- Vegetation).

#### **3.2.2.2 Fish and Wildlife**

##### **A. Fish and Wildlife Species Observed and Expected**

The Refuge provides important wetland habitat that sustains migratory birds of the Pacific coast. The estuary is both a wintering area and a migrational stop-over area for waterfowl of the Pacific Flyway.

In addition to migratory and resident bird populations, the estuary supports many species of fish. They use the estuary for spawning, as a nursery for their young, for feeding and for passage between the ocean and the upper river. The estuary is particularly important as a feeding area for juvenile salmon while they complete the physiological changes that allow them to survive in ocean waters.

The estuary also supports marine mammals such as harbor seals and California sea lions. Other mammals include beaver, river otter, muskrat, nutria, weasel, mink, raccoon, and deer.

The grassed dredge spoil islands provide excellent nesting habitat for western Canada geese as the islands are above the reach of the tides and relatively free of mammalian predators. With management, the grasslands can provide considerable forage for the area's growing goose population. The numbers of nests have been increasing each year. In 1991, Miller Sands supported 235 nests and Jim Crow Sands supported 65. Rice Island was not surveyed for goose nests in 1991, but supported 96 nests in 1990.

Approximately 4,100 pairs of Caspian terns nested on the western tip of Rice Island in 1991. Double-crested cormorants also nest within the Caspian tern colony. In 1991, 841 nests were counted. Approximately 300 pairs of gulls (glaucous-winged, western and hybrid) also nest on Rice Island and nearby Miller Sands Spit. In 1991, 152 nests were counted on Miller Sands Spit.

The tidal marshes and their associated flats and channels provide important habitat for fish, birds, and mammals. Mudflats, sand bars, and marshes are extremely productive. The microscopic plants and animals living in the mud and water are the beginning of the food web for worms, shellfish, and insects which in turn supply the food for birds and mammals. The shallow areas and marshes serve as nurseries and sanctuary for juvenile fish and resting sites for shorebirds and waterfowl. The marsh vegetation also contributes significantly to the estuary nutrient supply.

The intertidal marsh and mud flat complexes at Karlson Island and Miller Sands lagoon are important resting/feeding areas for wintering waterfowl, with 1,000 to 3,000 ducks and geese often present at each.

The tidal swamps support numerous species of birds and mammals most of which have been mentioned previously (Section 3.1.2.2 -- Fish and Wildlife). There is a great blue heron rookery on Karlson Island which typically contains between 150 and 200 nests.

## **B. Threatened and Endangered Species**

Bald eagle numbers vary in the estuary, from about 40 in late summer to more than 150 in February and March. There are three bald eagle nest sites within the Refuge boundaries, one of which is located on Karlson Island. In 1989 and 1990 the nest was occupied, but failed (no successful reproduction) (Service, 1990). A pair of bald eagles built a nest on a small cottonwood on Rice Island in 1991, but the nest failed (Service, 1992). As documented previously, bald eagle productivity within the estuary is low. This is thought to be due to the presence of contaminants such as DDE and PCBs.

Migrating and wintering peregrine falcons feed and rest within the estuary.

Columbian white-tailed deer have been documented within the Refuge, but have not been sighted on any of the lands proposed for exchange.

### **3.2.3 CULTURAL AND SOCIAL ENVIRONMENT**

#### **3.2.3.1 Land Use**

The Refuge was established in 1972 to protect the wetland habitats of the Columbia River Estuary as a wintering area and migrational stop-over area for migratory birds -- primarily waterfowl and shorebirds. The primary wildlife management objective of the Refuge is to protect and enhance Columbia River Estuary habitats for migratory birds and resident fish and wildlife.

The Refuge's management program consists of monitoring, planning, and enforcement. Monitoring includes both establishing baseline data and long term monitoring of key wildlife populations. The planning function involves participation in the overall management planning processes for the estuary being conducted by other agencies. Enforcement involves not only game laws but Corps permits, Endangered Species Act Section 7 consultations, and other regulatory requirements.

Managing and enhancing habitats has at times been difficult to maintain due to the different missions of the various agencies conducting activities within the Refuge. Additional spoil deposition has occurred on Miller Sands and Rice Island, but a grass seeding and habitat maintenance program on new spoils has been inconsistent due to Corps and Service staffing and funding fluctuations.

#### **3.2.3.2 Public Use**

Service Public Use reports indicate an estimated 8,158 visits were made to the Refuge in 1989. The Refuge is accessible only by boat, so the majority of visits were in a water-related activity. These visits were tallied in various categories, including (in descending order of popularity); general waterfowl hunting, cold-water fishing, boating, wildlife observation, warm-water fishing, picnicking, and camping.

##### **A. Hunting**

Waterfowl hunting is the major public use activity on the Refuge. Hunter visits have been declining, apparently in response to shorter seasons, reduced bag limits, and steel shot regulations.

## **B. Fishing**

Fishing is the second most popular activity on the Refuge and considered in two categories; cold and warm water. Cold-water fisheries also include commercial gillnetting for several species of salmon by local fishing. Depending on the quality of the fish and ability of the fish sorter, they are sold for use in restaurants or as cat food. This type of harvest has long been contested by sport-fishing groups who believe that sport fishing has a more positive image and contributes significantly more to the general economy. Oregon regulates sport fishing since most of the Refuge is located in that State. However, people fishing from boats in the Columbia may use either a Washington or Oregon license.

## **C. Wildlife Observation**

Most wildlife observations are conducted from boats and occasionally by foot when visiting a particular island. During the City of Portland's "Rose Festival" held each June, Coast Guard vessels traveling up the Columbia River from Astoria to Portland pass through the Refuge. Refuge personnel have accompanied other passengers and provided a unique tour and interpretive experience for interested wildlife observers. Boating continues to be a popular activity, although it is generally associated with other activities.

## **D. Camping and Picnicking**

The Refuge is open for day use only. Picnicking occurs primarily on Welch Island and is generally associated with other activities. Although camping is not allowed, it is known to occur in non-sensitive areas.

## **E. Houseboats**

Thirty privately owned float houses are moored within the Refuge and have been used in support of duck hunting and commercial fishing activities since before the Refuge was established. The cooperative agreements with the State of Oregon and Clatsop County encourage this use, which is permitted within the Refuge under Special Use Permits.



## CHAPTER 4.0 ENVIRONMENTAL CONSEQUENCES

### 4.1 SOUTH TONGUE POINT

This chapter discloses the potential consequences or impacts of each of the three alternatives described in Section 2.3 of Chapter 2.0. The first part of the chapter addresses the implementation of each alternative and the environmental consequences of alternative actions on the physical, biological, cultural, social, and economic environment. The latter part of this chapter provides a summary comparison of the alternatives based on these environmental factors, as well as key issues identified in Chapter 1.0.

#### 4.1.1 PHYSICAL ENVIRONMENT

##### 4.1.1.1 Topography

###### A. Upland Topography

###### Alternative A - Development of South Tongue Point

In order to implement Alternative A, the site would be cleared and grubbed and an average 2 to 2.5 feet of structural fill (maximum of approximately 4.5 feet of fill) added to all developed areas with permanent structures or outdoor storage. Finished floor elevations would be at least 12 feet NGVD (elevations are currently 7 to 16 feet NGVD). Approximately 36 acres would be filled, with an approximate fill amount of 120,000 cubic yards of fill. Fill would be obtained from an off-site, upland source.

Small areas of existing wetlands would be filled to smooth the contour of the development area (Section 4.1.1.3.D -- Wetlands). The site would continue to slope towards the perimeter with the high point in the central part of the site in order to facilitate site drainage. These changes would not be significant.

###### Alternative B - Development of South Tongue Point with Road Connection to North Tongue Point

Alternative B would have the same effects on the site's topography as Alternative A plus additional fill to create the access road embankment to North Tongue Point. Because the engineering design of this road connection has not been done, the fill amounts for the road connection have not been calculated but would probably be in the range of 100,000 cubic yards.

### Alternative C - No Action Alternative

Alternative C would result in the topography of the upland portion of the South Tongue Point site remaining in its present condition.

## **B. Aquatic Topography**

### Alternative A - Development of South Tongue Point

According to a recent hydrographic survey (David Evans and Associates, Inc., 1992), the existing access channel and turning basin depths are a minimum of approximately 19 feet MLLW, with areas ranging from 19 feet to 32 feet MLLW. These depths are sufficiently deep for all proposed uses. No dredging would be needed to initiate the project at South Tongue Point.

All piers would be constructed using barge-mounted pile-drivers to drive deep-water piles. The shallow-water and tidal marsh portion of the piers would be constructed from temporary piers to minimize impacts to aquatic topography and wetland vegetation. Except for the footprint (approximately 1.5 square feet) of each pile (a total of approximately 460 piles, or 690 square feet), no alterations to aquatic topography would result from the Alternative A. These changes would not be significant.

During Phase 2, maintenance dredging may be required to keep the access channel and turning basin at the required 18 feet MLLW. Maintenance dredging would be needed only if the channel became too shallow for passage by moderate draft vessels. At the present time, the channel is 19 to 32 feet MLLW. The shoaling rate of the channel is approximately 0.2 to 0.4 feet per year (Ogden Beeman & Associates, Inc., 1992). Given this shoaling rate, the earliest possible time that dredging may become necessary would be 6 years from the present (Ogden Beeman & Associates, Inc., 1992). Assuming this dredging interval and the maximum shoaling rate, a maximum of 177,000 cubic yards of sediments may need to be removed. This amount of dredging could take up to several weeks to complete. Dredging would take place only in those areas where sediment accumulation has reduced water depths to levels significantly shallower than 18 feet MLLW. Prior to any dredging, a hydrographic survey would be conducted in order to identify those areas where dredging is needed.

The potential impacts of dredging are discussed in Section 4.1.1.2.B -- Sediments, 4.1.1.3.A -- Surface Water Quality, 4.1.2.2 -- Fish and Wildlife, and 4.1.1.8 -- Hazardous Materials.

### Alternative B - Development of South Tongue Point with Road Connection to North Tongue Point

Phase 1 of Alternative B would have the same effects on the aquatic topography of South Tongue Point as Alternative A.

For Phase 2 of Alternative B, in addition to the potential need for maintenance dredging, approximately four acres of mudflats and tidal marshes would be filled to construct the connecting road between North Tongue Point and South Tongue Point (Section 4.1.1.3.D -- Wetlands).

#### Alternative C - No Action Alternative

Alternative C would result in the aquatic topography of the South Tongue Point site generally remaining in its present condition. Sedimentation would continue at current rates.

#### **4.1.1.2      Soils, Geology, and Sediments**

##### **A.      Soils and Geology**

#### Alternative A - Development of South Tongue Point

The subsurface geology and soils would remain intact for Alternative A. Surface organic material would be removed and an average of 2 to 2.5 feet of fill material would be placed on top of the existing soils to bring the elevation of South Tongue Point to a level at which the finished floor elevations would be at least 12 feet NGVD (elevations are currently 7 to 16 feet NGVD). Approximately 36 acres would be filled, with an approximate fill amount of 120,000 cubic yards of fill. Fill would be obtained from an off-site, upland source. This change would not be significant.

#### Alternative B - Development of South Tongue Point with Road Connection to North Tongue Point

Impacts to geology and soils from Phase 1 of Alternative B would be the same as for Alternative A. Approximately four acres of additional fill would be placed in an area of tidal wetland mudflats for the construction of the connecting road to North Tongue Point during Phase 2. Because the engineering design for the road connection has not been done, fill amounts are not known but would probably be in the range of 100,000 cubic yards. The impact of this fill is discussed in Section 4.1.1.3.D -- Wetlands, and 4.1.2.2 -- Fish and Wildlife.

#### Alternative C - No Action Alternative

Alternative C would not result in alterations to on-site soils or geology.

## **B. Sediments**

### Alternative A - Development of South Tongue Point

During construction of Phase 1 of Alternative A, sediments would be disturbed for the placement of piles to support four new piers and a launchway. It is expected that this activity would result in a short-term local increase in suspended sediments; however, this is not expected to be a significant impact. The type of pile that would be used to construct the piers and trestles for this project is known as a "displacement pile," which does not result in deeper sediments being brought to the surface (Mallick, pers. comm, April 7, 1992). Turbidity resulting from the pile driving would be temporary (approximately 48 hours). The Navy pier would be built in 1993. Other piers would be built in response to market demand.

Some maintenance dredging may be required during Phase 2 to maintain the basin and navigation channel depth to 18 feet MLLW (Section 4.1.1.1.B -- Aquatic Topography). Turbidity associated with dredging would be temporary (approximately 48 hours following completion of in-water work).

Propeller wash from the Navy minehunter coastal craft is similar to that of a typical 185-foot craft. Turbidity from ship propeller wash would not be a significant adverse impact of the project because of the depth of the navigation channel, the draft of the vessels that would be using South Tongue Point, and the slow speed with which they would be approaching the piers.

### Alternative B - Development of South Tongue Point with Road Connection to North Tongue Point

Effects on sediments from implementation of Alternative B would be the same as those of Phase 1 of Alternative A. Additional impacts associated with Phase 2 of Alternative B would be sediment disturbance resulting during construction of the road connection to North Tongue Point, and the loss of the existing natural wetland filtration of storm water.

### Alternative C - No Action Alternative

Alternative C would not result in any alteration to the existing sediments in the subtidal area at South Tongue Point, so that sedimentation rates would continue at their present rate, increasing the depth of the sediment in the navigation channel and the turning basin 0.2 to 0.4 feet a year.



#### 4.1.1.3      Hydraulics and Hydrology

##### A.      Surface Water Quality

###### Alternative A - Development of South Tongue Point

Many of the activities associated with Alternative A could potentially have an impact on surface water quality. Areas of concern include impacts from construction, stormwater runoff, potential maintenance dredging, and accidental spills. These activities can be classified in to two general categories: construction impacts and operation impacts.

**Construction Impacts:** Short-term adverse impacts to water quality are likely to occur during construction. These impacts would be associated with increases in turbidity caused by soil disturbances during near-water or in-water construction. In addition, stormwater that comes into contact with disturbed upland areas during construction could transport pollutants to the river as well.

Construction impacts would be short-term and minor provided that regulatory control programs designed to minimize construction impacts are adhered to. All conditions of the National Pollutant Discharge Elimination System (NPDES) stormwater permit issued by the Oregon Department of Environmental Quality should be met. These permits are issued for construction activities that disturb more than five acres of land for the purpose of preventing erosion and the subsequent discharge of sediment and other contaminants into receiving waters. The permits require erosion control plans to be prepared and then implemented during construction. The plans must consider the use of erosion control methods such as gravel entrance and exit pads, stormwater diversion, settling ponds, filters, and vegetative practices. Control features must be inspected regularly during construction.

**Operation Impacts:** Adverse impacts to water quality from ongoing activities could occur as a result of stormwater runoff from impervious surfaces and accidental spills, and turbidity and re-suspension of sediments from potential maintenance dredging (in Phase 2). Impacts to water quality from individual tenants would be minimized by structuring leases in a manner that requires contingency plans for accidental spills, proper stormwater management, and other water quality control measures for tenant-specific issues. Significant adverse impacts would not occur, however, provided that proper control measures are implemented (Section 4.5 -- Mitigation Measures).

If maintenance dredging is found to be necessary, the main impact would be a temporary increase in turbidity. This impact would be minimized by limiting the frequency, duration, and extent of dredging activities. Given the predicted shoaling rate, the earliest possible time that dredging may become necessary would be six years from the present (Ogden Beeman & Associates, Inc., 1992). Assuming this dredging interval and the maximum shoaling rate, a maximum of 177,000 cubic yards of sediments may need to be removed. This amount of

dredging could take up to several weeks to complete. Dredging would take place only in those areas where sediment accumulation has reduced water depths to significantly shallower than 18 feet MLLW. Prior to any dredging, a hydrographic survey will be conducted in order to identify those areas where dredging is needed. Associated turbidity would be expected to remain for approximately two days following the conclusion of the dredging activity.

An additional water quality concern raised during the Scoping process was the potential for a release of contaminants from resuspended sediments during dredging. The likelihood of significant levels of contaminants in the sediments of the access channel area is very low (Section 3.1.1.9.B -- Sediment Hazardous Materials and Section 4.1.1.8.A -- Upland Hazardous Materials). However, sediment testing would be completed prior to any dredging activity in the area. If sediments were found to include significant levels of contaminants, the required containment measures would be undertaken.

No significant impacts to water quality are expected from Alternative A provided that the measures discussed above are followed. No violations of State water quality standards would be expected. The discharge of organic materials would be minimal and not have a significant effect on the concentration of dissolved oxygen in the Columbia River. The discharge of nutrients would be minimal following treatment of stormwater discharges. The discharge of sediments would be controlled to minimize impacts on turbidity and dissolved solids. Proper spill prevention plans would minimize the potential of toxic substances entering the water.

#### Alternative B - Development at South Tongue Point with Road Connection to North Tongue Point

Alternative B would have similar impacts to Alternative A, except that removal of four acres of tidal marsh and mudflats for the road connection would result in the loss of the existing natural wetland filtration of storm water.

#### Alternative C - No Action Alternative

No changes to surface water quality in the vicinity of South Tongue Point would occur due to Alternative C.

### **B. Groundwater**

#### Alternative A - Development of South Tongue Point

Negotiations leading to the proposed land exchange that is part of Alternative A led to the discovery of some hazardous materials on the site that may be having an adverse effect on groundwater (Section 3.1.1.9 -- Hazardous Materials). The Corps is removing these materials, which will have a beneficial impact on the groundwater of the South Tongue Point area.

In addition, the Corps Astoria Field Station, which is presently on a septic system, would connect to the Astoria municipal sewer system when that service is provided to the site. This would be a beneficial impact to groundwater quality from the proposed project.

Industrial uses typically store materials that could have a detrimental effect on groundwater if not properly managed. See Section 4.1.1.8 -- Hazardous Materials for a discussion of this potential impact.

#### Alternative B - Development of South Tongue Point with Road Connection to North Tongue Point

Alternative B would have the same effects on groundwater as Alternative A.

#### Alternative C - No Action Alternative

No changes to the groundwater of South Tongue Point would occur as a result of Alternative C.

### **C. Water Courses and Flood Plains**

#### Alternative A - Development of South Tongue Point

**Water courses:** Alternative A would not impact any water courses.

**Flood Plains:** The current elevation of the site ranges from 7 to 16 feet NGVD. The 100-year flood plain is at 9.2 feet NGVD. All structures on the site would be constructed so that the finish floor elevation is at least 12 feet NGVD. Impacts to structures from a 100-year flood event would not be significant and the amount of fill placed on South Tongue Point would not affect flood flows through this portion of the Columbia River.

#### Alternative B - Development of South Tongue Point with Road Connection to North Tongue Point

**Water Courses:** The proposed Phase 2 connecting road to North Tongue Point would cross the Mill Creek drainage at the point where the drainage enters the Columbia River Estuary. Mill Creek is currently crossed by the Burlington Northern Railroad line at this point, and the drainage is crossed by a trestle. This crossing has existed for approximately 100 years. The connecting road would also have a bridge. Energy dissipators (e.g., riprap) would be installed to insure that the present flows from Mill Creek into the Columbia River Estuary would not increase in velocity. The roadway bridge would not have a significant impact to the drainage. Impacts to the wetland and mudflat habitat found in this location resulting from approximately four acres of fill required for the connecting road are discussed in Section 4.1.1.3.D -- Wetlands.

**Flood Plains:** Phase 1 of Alternative B would have a similar effect on the flood plain as Alternative A.

#### Alternative C - No Action Alternative

No changes to any water courses or flood plain at South Tongue Point would occur as a result of Alternative C.

### **D. Wetlands**

#### Alternative A - Development of South Tongue Point

Section 404(b)(1) of the Clean Water Act requires a consideration of alternatives to actions that would affect wetlands. There are five wetland areas that would be affected by construction activities for Phase 1 of Alternative A (Table 4-1 and Figure 2-5). All of these impacts would occur in the willow/alder plant community. Impacts to wetlands have been minimized as much as possible, with a total loss of 0.57 acres. As discussed in the following text, wetland fills are proposed only in areas necessary to create a uniform and efficient site access and an efficient use of upland development parcels.

The fill in Areas A, B, and C would be associated with the construction of the internal public access system. The total area to be filled would be 0.19 acres. Alternatives to fill that were considered included the use of pile-supported structures and relocation of the new road. These alternatives were dismissed because a pile-supported structure would not be cost effective, realignment of the roadway to avoid these three fill areas would result in tighter radius curves on the road, reduced traffic safety, and reduced efficiency of the development parcels.

Fill in Area D would be necessary to accommodate site preparation for a water-dependent user. The existing swale is about 30 feet wide and 400 feet long, extending diagonally inland from the east side of the site. Alternatives to fill that were considered included use of pile-supported structures and redesign of the site to avoid the fill. These alternatives were dismissed because a pile-supported structure would not be cost effective and would not preserve wetland functional values. Preservation of this wetland would significantly reduce the development and operational efficiency of the upland parcel.

Fill in Area E would be associated with the access road into the Navy site. The 0.08-acre fill to accommodate the new road would minimize the amount of fill that would be necessary, while accommodating the office, shop, storage, and barracks on the seven-acre site. Access into the Navy site requires crossing the small wetland area. Alternatives to fill that were considered included use of pile-supported structures and relocation of the new road. These alternatives were dismissed because a pile-supported structure would not be cost effective, and relocation of the road to the north side of the site would significantly reduce the efficiency of the site utilization if the pier were not moved north to align with the road. Moving the pier north would require



**TABLE 4-1**  
**SUMMARY OF WETLAND IMPACTS**

| <u>Area</u> | <u>Acres</u> | <u>Activity</u>                        |
|-------------|--------------|----------------------------------------|
| A           | 0.05         | Fill for road construction             |
| B           | 0.09         | Fill for road construction             |
| C           | 0.05         | Fill for road construction             |
| D           | 0.30         | Site preparation                       |
| E           | <u>0.08</u>  | Culvert and fill for road construction |
| Total       | 0.57         |                                        |

extensive initial dredging for the berthing areas. Dredging has been identified by the Service as a potentially detrimental activity to be avoided or minimized to the extent possible.

A total of 0.57 acres of wetland fill would be required for Phase 1. The area to be filled would comprise approximately 0.2 percent of the total tidal/subtidal area at South Tongue Point (approximately 259 acres, including large contiguous areas of wetland habitat at the north and south ends of the site). This loss of wetland would not be a significant impact. However, because a Corps 404 permit and a Removal/Fill permit from the Division would be required for the fill associated with the project, a comprehensive wetland mitigation program has been developed to address all wetland impacts at South Tongue Point and is included as Appendix C.

In addition to the 0.57 acres of fill required for the South Tongue Point project, development of pile-supported structures for water access would require the removal of some trees and shrubs in the wetland area on the east side of the site. All piers would be constructed using barge-mounted pile-drivers in deeper water and the shallow-water and tidal marsh portion of the piers would be constructed from temporary piers to minimize permanent impacts to wetland vegetation.

In order to protect the wetland values of the site following project construction, permanent setbacks would be located between developed areas and the existing wetlands. The setbacks would average 30 feet wide, with a setback of approximately 500 feet of natural area at the north end of the site. Setback treatments would include retention of approximately 12.3 acres of existing upland vegetation, planting turf grass along portions of the Navy site (to maintain the

required clear area for security), landscaping with shrubs and trees, and construction of biological stormwater runoff treatment facilities (Section 4.1.1.3.A -- Water Quality).

#### Alternative B - Development of South Tongue Point with Road Connection to North Tongue Point

Impacts to wetlands from implementation of Phase 1 of Alternative B would be the same as for Alternative A.

For Phase 2 of Alternative B, approximately 4 additional acres of wetland fill would be required for the connecting road to North Tongue Point (Figure 2-5). Of this four-acre area, approximately 0.4 acre is alder/willow wetland, 0.5 acre is mudflat, and the remaining 3.1 acres are emergent marsh.

Alternatives to this connecting road that were considered include construction of a pile-supported structure and use of U.S. Highway 30. These alternatives were dismissed because a pile-supported structure would not be cost effective and would alter the wetland functions along the length of the roadway. Use of U.S. Highway 30 to provide a road connection between North Tongue Point and South Tongue Point would require a considerably longer travel distance of approximately 0.5 mile longer each way. Each trip along U.S Highway 30 would require entering and leaving the main highway and would also increase intersection congestion and reduce traffic safety. Movement of slow speed and oversized loads and other industrial travel between North and South Tongue Point area would be safer and more conveniently accommodated on the road connection to North Tongue Point.

#### Alternative C - No Action Alternative

No changes to the existing wetlands at South Tongue Point would occur as a result of Alternative C.

#### **4.1.1.4      Air Quality**

##### Alternative A - Development of South Tongue Point

It is not expected that any of the uses included within Alternative A at South Tongue Point would have a significant adverse impact on the area's presently good air quality (Section 3.1.1.6 -- Air Quality). However, it is possible that the new industrial areas provided for in Alternative A at South Tongue Point may have the potential to be a new emission source. In addition, the increase of traffic to the site may temporarily increase local levels of motor vehicle-related air pollution until the Astoria Bypass displaces a portion of the through traffic (Section 4.1.1.6.A -- Transportation).

In general, Oregon requires that the best practical treatment and control of air containment emissions be provided. A Written Notice of Construction would have to be submitted to the Oregon Department of Environmental Quality if sources have fuel, refuse, or open burning equipment, air pollution control equipment, or process equipment. Alternative A is not expected to include any of these uses.

Specific emission sources identified in OAR 340-20-155 are required to have an Air Containment Discharge Permit before source construction can begin. None of the water-dependent uses included in Alternative A are identified in OAR 340-20-155. It is possible that the non-water-dependent uses may include a secondary wood products facility, which may be required to seek an Air Containment Discharge Permit. The permit process requires completing an Air Containment Discharge Permit application, which includes information regarding source, emissions, and control equipment.

For emission sources that are classified as "major," a New Source Review is required. Major sources are stationary sources that emit or have the potential to emit any pollutant at a "significant emission rate," or 100 tons of pollutants annually. It is very unlikely that any of the uses proposed for Alternative A would fall into this category because of their relatively small size.

#### Alternative B - Development of South Tongue Point with Road Connection to North Tongue Point

Alternative B would have the same air quality impacts as Alternative A, with the exception that the reduced travel distance and reduced intersection activity would result in a minor reduction in the amount of pollutants created by motor vehicle use.

#### Alternative C - No Action Alternative

No changes to existing air quality in the vicinity of South Tongue Point would occur as a result of Alternative C.

#### **4.1.1.5      Noise and Activity**

##### Alternative A - Development of South Tongue Point

**Construction Noise and Activity Impacts:** Noise impacts from construction can be considered to be temporary. For example, construction of the Navy facility, the only known tenant for the project at this time, is anticipated to take approximately two months for trestle and pier pile driving, another two months to complete the pier, and a total of less than one year to bring the project to start-up. It is anticipated that the entire South Tongue Point project would be completed over a span of approximately 7 years, with construction intermittent during that time.

**Project Operation Noise and Activity Impacts:** Alternative A consists of the existing Corps Astoria Field Station and: (1) the Navy homeport, (2) water-dependent uses such as a barge fabrication facility or berthing facility for an oil spill recovery team (or similar use), (3) a community college marine technology and environmental training facility, (4) non-water-dependent uses such as manufacturing, storage of marine cargo, general warehousing (or similar use), and (5) a neighborhood service center. It is expected that the barge fabrication facility would generate the majority of the ongoing noise impacts.

The Oregon environmental noise restrictions are designed to protect "noise-sensitive" properties, which are defined as "real property on which people normally sleep and attend schools, churches, and public libraries." The closest properties to South Tongue Point falling into the "noise-sensitive" category are four residences located between U.S. Highway 30 and South Tongue Point, and another six located in the vicinity located on the west side of the highway. At their closest to the project site, residences are located approximately 400 feet from the area proposed for commercial use, 400 feet from the area proposed for general non-water-dependent uses (such as a secondary wood products facility), and more than 1,600 feet from the area proposed for use by the community college as a marine training facility. A residence is located approximately 500 feet from the proposed barge fabrication facility, which is assumed to be the greatest noise contributor to the project. The residences are adjacent to the existing U.S. Highway 30, and are subject to the noise impacts of that road.

Noise levels generated by traffic on U.S. Highway 30 were computed for the peak hour for the years 1992, 2002, and 2015, both at 30 and 45 miles per hour (Table 4-2). The truck mix was eight percent in all cases for the existing traffic. The mix of medium to heavy trucks was assumed to be six percent heavy trucks and two percent medium trucks. The heavy trucks contribute more to the noise level, so this provides a conservative estimate of highway traffic noise.

The projected noise level for peak hour traffic in 2002 is 75 dBA, and for the year 2015, the  $L_{eq}$  is 76 dBA (Table 4-2). These levels are all calculated for a vehicle speed of 45 miles per hour. With the addition of the projected local traffic, the  $L_{eq}$  levels increase to 76 dBA for 1992, 76 dBA for 2002, and 77 dBA for 2015. A noise level increase of 1 dBA cannot be discerned by humans, so the additional noise from local traffic would be insignificant.

If the vehicle speed is reduced to 30 miles per hour, the  $L_{eq}$  levels would be 71 dBA for the 1992 peak hour traffic levels, 72 dBA for the 2002 peak hour traffic levels, and 73 dBA for the 2015 peak hour traffic levels. Adding the projected local traffic to U.S. Highway 30 traffic at 30 miles per hour is also insignificant. Again, the noise contribution of the expected increase in local traffic would be negligible and not discernable by humans.



**TABLE 4-2**  
**CALCULATED NOISE LEVELS**

---

Current and projected traffic noise at 45 miles per hour

|          | 1992 | 2002 | 2015 |
|----------|------|------|------|
| $L_{eq}$ | 75   | 75   | 76   |
| $L_{10}$ | 78   | 78   | 79   |

Current and projected traffic noise at 45 miles per hour plus local traffic generated by the proposed marine industrial development.

|          | 1992 | 2002 | 2015 |
|----------|------|------|------|
| $L_{eq}$ | 76   | 76   | 77   |
| $L_{10}$ | 79   | 79   | 80   |

Noise levels at U.S. Highway 30 generated by barge building.

| $L_1$ | $L_{10}$ | $L_{50}$ |
|-------|----------|----------|
| 56    | 50       | 42       |

---

Source: R&W Engineering, Inc., 1992.

By superimposing the barge construction noise data (collected from an existing facility) on the ambient noise in South Tongue Point area, it is possible to predict that the barge building operation would add 20 to 32 dBA to the existing local South Tongue Point noise level during the daytime hours and 32 to 38 dBA to the nighttime hours.

The barge building levels would be significantly reduced from the source to the nearest residence, which is approximately 515 feet away. The peak SPL from the barge construction equals the peak traffic hour  $L_{eq}$  but exceeds the traffic SPL by 10 dBA during the nighttime hours. An increase in SPL of 10 dBA would be noticeable and probably be judged objectionable. In addition to the peak barge building SPL, the barge building noise is an "impact noise," which most people find annoying because of the sudden increase and decrease in SPL over a short time period. Impact noise would have to be attenuated or mitigated in some manner for it to be acceptable during nighttime hours.

The existing ambient SPL is quiet and would increase on South Tongue Point with the proposed marine industrial development. The increase in traffic caused by the development would not increase the traffic generated SPL to a noticeable level. The barge building activity would meet all DEQ regulations, but the impact characteristics of the noise may generate complaints during nighttime hours.

Measures would be taken, if necessary, to assure compliance with State noise regulations. Specific control measures would be defined by the frequency and intensity of the noise being produced. Measures could include administrative controls, specific siting criteria, or engineering methods ranging from individual component isolation to barriers surrounding entire facilities.

In addition to the general noise and activity impacts on nearby residences, it is necessary to consider the potential impacts of increased levels of noise and activity on a nearby resident pair of bald eagles, a Federally listed Threatened species (Section 3.1.2.2.B -- Threatened, Endangered, and Sensitive Wildlife Species). A discussion of the noise and activity impacts on bald eagles is found in Section 4.1.2.2.B -- Threatened, Endangered, and Sensitive Wildlife Species.

#### Alternative B - Development of South Tongue Point with Road Connection to North Tongue Point

Alternative B would generate similar noise and activity impacts to Phase 1 of Alternative A. Ultimately, Alternative B would have a slightly lesser noise and activity impacts than Alternative A because there would be movement of cars and trucks between South Tongue Point and North Tongue Point on the Phase 2 road connection. Travel on the connection road would require less total travel distance, less traffic on U.S. Highway 30, and fewer vehicles entering and leaving U.S. Highway 30.

### Alternative C - No Action Alternative

No changes to the existing levels of noise and activity at or in the vicinity of South Tongue Point would occur as a result of Alternative C. Existing noise would lessen over time when the Astoria Bypass is constructed.

#### **4.1.1.6      Public Facilities**

##### **A.      Transportation**

#### Alternative A - Development of South Tongue Point

The traffic impact from Alternative A was analyzed by David Evans and Associates (David Evans and Associates, 1991d) assuming that approaches to the intersection of U.S. Highway 30 and the site access road would consist of two lanes: a left-turn lane and a through/right-turn lane. The intersection was also assumed to operate with the site access road approach under stop sign control.

Although the Astoria Bypass, which would route traffic south of U.S. Highway 30 and the City of Astoria, is scheduled for construction before the year 2000 in the Oregon Department of Transportation's Six-Year Program (1996), the traffic impact of the project was considered as if the bypass construction were delayed until after 2000. The year 2000 "background" traffic volumes (without site traffic) were determined by interpolating between the 1995 and 2005 traffic forecasts developed by the Oregon Department of Transportation in a traffic analysis for the proposed U.S. Highway 30 bypass project (Oregon Department of Transportation, 1991b), and adding the traffic from other proposed economic development projects along the U.S. Highway corridor as identified in the U.S. Highway 30 Multimodal Study (Oregon Department of Transportation, 1991a).

The two-way background traffic volume on U.S. Highway 30 adjacent to South Tongue Point is projected to be 9,650 vehicles during the year 2000 without the construction of the Astoria Bypass. The peak hour two-way traffic volume is estimated at 890 vehicles with a directional distribution of 55 percent westbound and 45 percent eastbound during the AM peak hour, and 45 percent westbound and 55 percent eastbound during the PM peak hour.

The proposed project at South Tongue Point is estimated to generate approximately 1,686 two-way vehicle trips (843 inbound and 843 outbound) on an average weekday. Peak AM and PM hours would see an estimated 240 vehicles entering and leaving the site. It is estimated that 5 percent of the site traffic would be truck traffic during the AM and PM peak hours. These numbers were added to the year 2000 "background" traffic described above to determine the year 2000 total traffic volumes without the Astoria Bypass.

It is estimated that the vehicles turning left onto U.S. Highway 30 from the South Tongue Point access road would experience a Level of Service E (very long traffic delays) during the AM and PM peak hours. This is considered acceptable because the minor street left turn volume at 10 vehicles in the AM peak hour and 45 vehicles in the PM peak hour is very low. (Assuming the construction of the Astoria Bypass improves this Level of Service to B -- short traffic delays -- during the peak hours.) All the other turning movements at the intersection are estimated to be at an acceptable level of service A (little or no delay) or B during the AM and PM peak hours.

A signal warrant analysis revealed that the minor street volume during the peak hours warrants a signal at that intersection. However, since 75 percent of the vehicles are turning right from the site access road at that intersection, engineering judgement dictates that a signal would not be required at the intersection through 2000 if the bypass were not constructed by then.

Based upon this traffic analysis, Alternative A is determined to have no significant adverse impacts on traffic. The new intersection of the site access road and U.S. Highway 30 would be a safety benefit of the proposed project.

#### Alternative B - Development of South Tongue Point with Road Connection to North Tongue Point

Traffic impacts of Alternative B would be the same as for Phase 1 of Alternative A, except there would be less industrial traffic on U.S. Highway 30 travelling between North Tongue Point and South Tongue Point.

#### Alternative C - No Action Alternative

No changes in transportation to South Tongue Point would occur as a result of Alternative C, although the proposed Astoria Bypass project would still occur as planned.

### **B. Storm Drainage**

#### Alternative A - Development of South Tongue Point

As a result of Alternative A, the site would continue to drain from a central high point to the perimeter. The amount of impermeable surface would be increased, but runoff would be directed into biological stormwater runoff treatment facilities (Section 4.1.1.3.A -- Surface Water Quality) that would slow water velocity, reduce erosion, and provide water treatment. With implementation of this alternative, approximately 25,500 cubic feet of stormwater runoff would be discharged in a 25-year storm. There would be no direct discharge into the Columbia River. Potential water quality impacts of runoff are discussed in Section 4.1.1.3.A -- Surface Water Quality.



Alternative B - Development of South Tongue Point with Road Connection to North Tongue Point

The effects on storm drainage from implementation of Alternative B would be the same as for Alternative A.

Alternative C - No Action Alternative

No changes in storm drainage would occur at South Tongue Point as a result of Alternative C.

**C. Sanitary Sewer**

Alternative A - Development of South Tongue Point

Sanitary sewer would be provided to all parcels on-site as part of Phase 1 of Alternative A, including the existing Corps Astoria Field Station, which is presently on a septic system. Gravity sewer mains in the local service road would drain to a new pump station with discharge through a force main leaving the site along the existing access road and following U.S. Highway 30 to connect to the trunk sewer near the City of Astoria sewage treatment plant. There are not expected to be any adverse impacts on the City sewer from Alternative A. The removal of the existing septic drain field would be a beneficial impact of the project.

Alternative B - Development of South Tongue Point with Road Connection to North Tongue Point

Alternative B would have the same neutral or positive effect on the municipal sewer system as Alternative A.

Alternative C - No Action Alternative

No changes in the existing sewer situation at South Tongue Point would occur as a result of Alternative C.

**D. Domestic Water Supply**

Alternative A - Development of South Tongue Point

As part of Alternative A, a 12-inch diameter water main would be extended along U.S. Highway 30, entering the site along the existing access road embankment and distributed along the new on-site local service road to serve all parcels. In addition, the water main would be extended south along U.S. Highway 30 and tied to the City's 24-inch supply conduit west of the John Day community. This would provide a looped water supply with improved fire flow to the area, a beneficial impact of the proposed project.

#### Alternative B - Development of South Tongue Point with Road Connection to North Tongue Point

Alternative B would have the same beneficial effect on the municipal water system as Alternative A.

#### Alternative C - No Action Alternative

No changes to the existing domestic water supply to South Tongue Point would occur as a result of Alternative C.

#### **4.1.1.7      Utilities**

##### Alternative A - Development of South Tongue Point

As part of Alternative A, electric, telephone, cable, and natural gas utility lines would be extended to the site along the new on-site local service road. There are no adverse impacts expected to local utility suppliers from Alternative A.

##### Alternative B - Development of South Tongue Point with Road Connection to North Tongue Point

The effects on utilities resulting from implementation of Alternative B would be the same as Alternative A.

##### Alternative C - No Action Alternative

No changes to the existing utility distribution to South Tongue Point would occur as a result of Alternative C.

#### **4.1.1.8      Hazardous Materials**

##### **A.      Upland Hazardous Materials**

##### Alternative A - Development of South Tongue Point

The Corps recognizes the existence of hazardous waste on their property at South Tongue Point (Section 3.1.1.9 -- Hazardous Materials) and is scheduled to remove the waste by May, 1992 (Bartkus, pers. comm., January 24, 1992). GSA will not allow a land exchange to occur until the clean-up process is complete.

Fueling of all boats, barges, and ships would occur at the fueling facility at the Port of Astoria, three miles west of the site. However, the paints, solvents, and petrochemical products

necessary to maintain ships and machinery would be used and stored on-site as a part of Alternative A. (It should be noted that the Navy ships have fiberglass hulls and do not require painting.) Facilities which handle toxic or hazardous materials or large amounts of oil may be subject to various Federal and State regulations administered by the U.S. Environmental Protection Agency or the Oregon Department of Environmental Quality.

Treatment, storage, and disposal of hazardous waste is regulated by the Environmental Protection Agency under the Code of Federal Regulations, Title 40, Part 265 (40 CFR 265). This regulation specifies that regulated facilities must prepare a Contingency Plan detailing emergency procedures to be followed in case of accidents.

Bulk oil handling facilities are regulated by the U.S. Environmental Protection Agency under 40 CFR 112 which specifies that a Spill Prevention, Control and Countermeasures Plan must be prepared for facilities which store more than the minimum amount of oil specified.

The Oregon Department of Environmental Quality administers the Hazardous Waste Management Rules as set out in the Oregon Administrative Rules, Chapter 340.

Additional reporting and disclosure requirements may be required through the Superfund Amendments and Reauthorization Act of 1986, Title III. Title III is the Community Right-to-Know law which requires emergency response planning to be done by local authorities and businesses, emergency release reporting, hazardous chemical inventory reporting, and toxic chemical release reporting. All tenants of South Tongue Point would be required to have a spill response plan.

#### Alternative B - Development of South Tongue Point with Road Connection to North Tongue Point

Hazardous materials and waste would be handled in the same manner for Phase 1 of Alternative B as for Alternative A.

It is suspected that there may be hazardous wastes included within the fill at North Tongue Point in an area that would be impacted by the Phase 2 road connection. The Corps has installed monitoring wells, but the results of this study are not yet known (Purchase, pers. comm., January 24, 1992). Any hazardous wastes located in the fill area at North Tongue Point would be remediated prior to road construction, which would be a benefit of the proposed project.

#### Alternative C - No Action Alternative

The cleanup of existing hazardous materials identified as occurring on South Tongue Point would occur even if the proposed land exchange does not take place (Bartkus, pers. comm., January 24, 1992).

## B. Sediment Hazardous Materials

### Alternative A - Development of South Tongue Point

During the scoping process for this project, concern was expressed over the potential for of contaminants potentially present in the sediments at South Tongue Point to be released by construction activities and maintenance dredging, if it proves necessary (Section 4.1.1.1.B -- Aquatic Topography). As discussed in Sections 3.1.1.4.C (Sediments) and 3.1.1.9.B (Sediment Hazardous Materials), the potential for the presence of significant levels of hazardous contaminants in the sediments surrounding South Tongue Point is very low.

Pile driving would be expected to result in a short-term local increase in suspended sediments; however, this is not expected to be a significant impact. The type of pile that would be used to construct the piers and trestles for this project is known as a "displacement pile," which pushes sediments in a downward motion, compressing them, and would not result in deeper sediments being brought to the surface and dispersed (Mallick, pers. comm., April 7, 1992). Turbidity from such activities would be expected to last approximately two days.

The results of the sedimentation study (Ogden Beeman & Associates, Inc., 1992) revealed a sedimentation rate of 0.2 to 0.4 feet per year. Previous sampling, as described in Section 3.1.1.9.B (Sediment Hazardous Materials), indicates that any hazardous materials would be located at least 4 feet of below the sediment surface and would remain undisturbed by the dredging activity. As previously described, no significant levels of contaminants were found during the dredging of the North Tongue Point navigation channel in 1989, and no significant levels of contamination were found below 4 feet deep during sampling in 1990 of sediments between the piers at North Tongue Point. Since less activity has occurred at South Tongue Point than at North Tongue Point, it is reasonable to assume that contamination levels would be even lower at South Tongue Point.

Dredging would not be necessary to initiate the project, but modest maintenance dredging may be needed in the future to accommodate the Navy ships. Should channel maintenance dredging become necessary, additional detailed environmental studies would be required to assess any potential effects on fish and wildlife, as well as hydrological surveys to locate areas requiring dredging. As previously stated, it is not expected that sediments would be contaminated; however, if sediments were found to be contaminated, dredging and disposal would be conducted in compliance with all appropriate requirements and regulations. If sediments were not contaminated, it is expected that the dredge material would either be deposited on spoil islands in the vicinity, or transported for ocean disposal.

Chemical products such as paints, solvents, and fuels could potentially be deposited in off-shore sediments through run-off and accidental spills. If appropriate remedial measures (outlined in Section 4.1.1.8.A -- Upland Hazardous Materials and Section 4.5 -- Mitigation Measures) were not taken, and maintenance dredging was found to be necessary, this activity could result in the



resuspension of these materials. However, each tenant would be subject to a variety of State and Federal regulations which address contingency plans and emergency response procedures. Therefore, adverse impacts are not expected.

#### Alternative B - Development of South Tongue Point with Road Connection to North Tongue Point

Impacts relating to potential aquatic hazardous materials resulting from Alternative B would be the same as for Alternative A.

#### Alternative C - No Action Alternative

Alternative C would have no impact on existing sediments at South Tongue Point.

### **4.1.2 BIOLOGICAL ENVIRONMENT**

#### **4.1.2.1 Vegetation**

##### **A. Plant Communities and Threatened, Endangered, and Sensitive Plant Species**

#### Alternative A - Development of South Tongue Point

Impacts to plant communities expected to result from Alternative A would consist of wetland fill and direct removal of vegetation for project construction, and secondary impacts such as shading from trestles and piers. There may also be minor temporary impacts to open water (pelagic) vegetation from Alternative A, such as temporary short-term disturbances to photosynthesis from local turbidity resulting from the construction of the piers and from maintenance dredging, if it is found to be necessary (Section 4.1.1.3.A -- Surface Water Quality). Turbidity would be expected to disperse in approximately 2 days following completion of the in-water work.

No threatened, endangered, or sensitive plant species would be adversely impacted by Alternative A.

**Wetland Fill Impacts:** Wetland impacts are described in detail in Section 4.1.1.3.D. The area of wetland impact would total 0.57 acre, consisting entirely of the alder/willow plant community. Mitigation measures for this wetland impact are included as Appendix C.

**Direct Removal Impacts:** Impacts to upland vegetation resulting from Alternative A include removal of 62.7 acres of existing vegetation for project construction, including a 50-foot wide clear zone around the Navy facility. This vegetation type is well-represented within the Astoria area and the Refuge, and the impact of the removal is not considered to be significant. The plan for Alternative A includes the retention of 12.3 acres of natural upland vegetation within the wetland setback areas and the inclusion of 18.5 acres of landscaping (Figure 2-4).

In addition, the launch system for the barge facility would result in a temporary disturbance during rail laying and a periodic disturbance due to barge launching. This would require clearing an approximately 20,000 square feet area to accommodate rail installation. Vegetation in the path of the launch would require periodic mowing to allow passage of completed barges from the upland construction area to the water and the mooring pier. This mowing would result in a loss of some wildlife habitat value, since the structural diversity would be diminished. Approximately 1,050 square feet of alder/willow wetland, 4,800 square feet of scrub/shrub wetland, 2,100 square feet of emergent wetland, and 5,400 square feet of mudflat wetland would be impacted by the launch rail facility. This is a relatively small area, and is not expected to be a significant impact or to significantly change the functioning of the remaining plant communities on South Tongue Point.

**Shading Impacts:** Almost all plants depend on exposure to sunlight for photosynthesis. When plants that are adapted to full sunlight are shaded, the result is generally a decline in productivity. When the sunlight is fully blocked, the plants usually die. Plants that are adapted to partial sunlight, such as those that typically occur in a forest understory, may remain fully productive when shaded by structures.

The Navy facility would be expected to be typical of the structures built at South Tongue Point. The Navy trestle would be approximately 30 feet wide and 485 feet long, and the pier 100 feet wide and 300 feet long. Supporting the trestle, there would be 17 rows of piles with 4 piles 9 feet apart in each row, with the rows 30 feet apart. Supporting the pier, there would be 11 rows with 11 piles 9 feet apart in each row, with the rows 30 feet apart. Because of the linear shape of the pier and trestle structures, the wide spacing of the piles, and the height above the water (approximately 16 feet above MLLW), it is not expected that shading would result in a significant loss of vegetation on South Tongue Point.

It is expected that, since the structures are aligned in an east-west direction, there would be small areas that may be sufficiently shaded to inhibit most plant growth, and there would be some areas that convert to plants that are completely adapted to partial shade. This is not expected to significantly alter the functioning of the remaining plant communities on South Tongue Point.

The total shading impacts of all aspects of the proposed project are summarized in Table 4-3. It is important to note that this table shows the maximum total area that could be shaded if the sun were directly overhead. Because the sun's position moves throughout the day and throughout the seasons, the actual area permanent shading would be much smaller.

TABLE 4-3

**SUMMARY OF SHADING IMPACTS FOR THE PROPOSED  
SOUTH TONGUE POINT PROJECT IN SQUARE FEET  
(ALTERNATIVES A AND B)**

| Plant Communities | Navy Facility | Barge Facility | Industrial Facility | Community College | Total   |
|-------------------|---------------|----------------|---------------------|-------------------|---------|
| Alder/willow      | 4,500         | 2,100          | 1,950               | 1,050             | 9,600   |
| Scrub/shrub       | 2,400         | 3,300          | 2,700               | 4,800             | 13,200  |
| Emergent wetland  | 750           | 1,200          | 2,700               | 2,100             | 6,750   |
| Mudflat           | 3,000         | 5,400          | 6,300               | 5,400             | 20,100  |
| Open water        | 32,550        | 31,900         | 43,200              | 29,870            | 137,520 |
| Total             | 43,200        | 43,900         | 56,850              | 31,470            | 187,170 |

Alternative B - Development of South Tongue Point with Road Connection to North Tongue Point

Impacts and mitigation to plant communities resulting from implementation of Alternative B would be the same as those for Alternative A, except that Alternative B would require the removal of approximately four acres of wetland vegetation for the Phase 2 road connection to South Tongue Point (Figure 2-6). Of this 4-acre impact, approximately 0.4 acre is alder/willow wetland, 0.5 acre is mudflat, and the remaining 3.1 acres are emergent marsh. Upland impacts would include the clearing, cutting and filling of 0.4 acres of upland coniferous and deciduous vegetation to install the new road connection. The loss of this wetland habitat would be a significant adverse impact.

Alternative C - No Action Alternative

Alternative C would result in the plant communities of South Tongue Point remaining in their existing condition.

#### 4.1.2.2 Fish and Wildlife

##### A. Fish and Wildlife Observed and Expected

##### Alternative A - Development of South Tongue Point

**Benthic and Zooplankton Species:** It is anticipated that benthic and zooplankton communities would not be significantly affected by project development. At the present time, engineering plans have been completed for the Navy pier only. It is highly likely that the other three piers proposed for the project would have very similar specifications. Therefore, it can be estimated that, at full build-out, approximately 660 square feet of submerged land would be occupied by pilings. It is important to note, however, that the piles are widely spaced as described under Shading Impacts, above.

Disturbance to the substrate from pile driving would be minimal. Driving the piles would result in a temporary increase in turbidity which would diminish within approximately 48 hours. This area of Cathlamet Bay has existing levels of turbidity that are fairly high due to the flushing of tidal channels (Emmett, pers. comm., February 19, 1992) so the increase due to pile driving should be insignificant.

The type of pile that would be used to construct the piers and trestles for this project is known as a "displacement pile," which pushes sediments in a downward motion, compressing them, and would not result in deeper sediments being brought to the surface and dispersed (Mallick, pers. comm., April 7, 1992).

The pilings from the four new piers would constitute approximately 19,400 square feet of surface area which may be colonized by other organisms such as barnacles (*Balanus* spp.), bryozoans, and hydrozoans. These communities may in turn attract concentrations of *Corophium spinacorna*.

The wide spacing of the pilings (an average of 30 feet apart) are not expected to increase shoaling and sedimentation above present levels. Benthic communities should not be smothered by accelerated sedimentation.

At full build-out, approximately 157,620 square feet of open water and mudflat area would be shaded by the four new piers and trestles (Section 4.1.2.1 -- Vegetation). Shading is not expected to adversely affect either benthic or zooplankton communities.

Water quality is not expected to change significantly due to project development (Section 4.1.1.3.A -- Surface Water Quality). Project area runoff would be directed through biological stormwater runoff treatment facilities before entering estuary wetlands. Therefore, benthic and zooplankton communities should not be adversely affected by changes in water quality.



As discussed in Section 4.1.1.8 (Hazardous Materials), there is potential for hazardous spills from the proposed project. Under the careful operating procedures required by State and Federal law, it is not expected that spills would pose a significant threat to benthic and zooplankton communities in Cathlamet Bay.

Maintenance dredging to keep the navigation channel at 18 feet MLLW may be required during Phase 2 of Alternative A (Section 4.1.1.1.B -- Aquatic Topography). There has been concern expressed that this activity would impact the biotic component of the area through the dispersion of potentially hazardous chemicals into the food chain, if such materials exist (Section 3.1.1.4.C -- Sediments). However, as discussed in Section 4.1.1.3.A. (Surface Water Quality) and Section 4.1.1.8. B (Sediment Hazardous Materials), based on existing data for sediment sampling at both North Tongue Point and South Tongue Point, it is not expected that there are significant levels of contaminants in the sediments surround South Tongue Point. Further, if such contaminants do occur, it is likely that they would be located at 4 feet or deeper and would not be disturbed by dredging activities. Prior to any dredging, sediment testing and hydrographic surveying would be completed.

**Fishes:** Intertidal and shallow subtidal fish habitats are the areas where pilings would be placed. At the present time, the area of Cathlamet Bay at South Tongue Point is naturally turbid due to the flushing of tidal channels, so temporary increases in turbidity from the physical placement of piers should not adversely affect fish. Should piers eventually attract concentrations of amphipods, this could provide a food source for fish.

The four new piers and trestles would shade approximately 157,620 square feet of the intertidal and shallow fish habitat (Section 4.1.2.1 -- Vegetation); however, this shading should not adversely affect fish because of the wide spacing of piles within each pier and the height of the pier above the water. Shaded areas may provide dark areas for predatory fish to hide, however, there are few predatory fish species in the area (Emmett, pers. comm., February 19, 1992). Shaded areas may actually benefit fish by providing them cover from predatory birds.

As discussed above and in Section 4.1.1.8 (Hazardous Materials), there is potential for hazardous spills from the proposed project. Under the careful operating procedures required by State and Federal law, it is not expected spills would pose a significant threat to fish.

As discussed above under Benthic and Zooplankton Species, maintenance dredging to keep the navigation channel at 18 feet MLLW may be required during Phase 2 of Alternative A. As discussed above, this activity is not expected to have an adverse effect on fishes or their food items.

**Reptiles and Amphibians:** Full build-out of the project would eliminate the terrestrial red alder habitat used by reptiles and amphibians on South Tongue Point. The remaining natural vegetation and the landscaped areas would support a much reduced population and diversity of reptiles and amphibians. However, the habitat type is well represented in the Astoria area and

within the Refuge, and regional populations of reptiles and amphibians would not be affected by the proposed project. Species expected are common and the loss of small numbers of individuals would not be significant.

**Birds:** As stated above, the 63 acres of upland forested habitat that would be lost to development represents a habitat type common in the project area. Other than bald eagles (Section 4.1.2.2.B -- Threatened, Endangered, and Sensitive Wildlife Species), it is expected that regional populations of resident and migratory bird species would be relatively unaffected by development of South Tongue Point.

**Mammals:** Regional mammal populations would not be affected by the proposed development at South Tongue Point.

On-site wetland habitats would be essentially unchanged in community structure and ecological function; therefore, wetland-dependant mammals would not be adversely affected.

The majority of the upland forested habitat (63 acres) would be eliminated due to project development. However, this habitat type is very common in the Astoria area, and is well represented within the Refuge. Black-tailed deer and smaller mammals such as opossum, mice, shrews, and voles would be displaced by the loss of this habitat. All of these species are quite common, and the small numbers of individuals that would be lost would not constitute a significant impact to regional populations.

#### Alternative B - Development of South Tongue Point with Road Connection to North Tongue Point

**Benthic and Zooplankton Species:** Impacts to benthic and zooplankton species from Phase 1 of Alternative B would be the same as predicted for Alternative A. In addition to the development of South Tongue Point proposed in Alternative A, Phase 2 of Alternative B includes a road connection between South Tongue Point and North Tongue Point with a road constructed over approximately four acres of intertidal mudflat and tidal marsh habitat.

The fill required for construction of the road would eliminate approximately four acres of area which support benthic and zooplankton species. Zooplankton populations, which reside in the water column, would be little affected; they would simply have less space to occupy during high tides. Benthic organisms are typically abundant in the types of habitats proposed for fill. Although these organisms are a critical component of the estuary food chain, it is not expected that Alternative B would have a significant impact on their populations within Cathlamet Bay.

Tidal marsh habitat plays an important role in nutrient cycling within the Mill Creek embayment. Loss of the approximately four acres of this habitat associated with the Phase 2 road connection would cause a minor reduction in the nutrient cycling and water circulation within the embayment.

Nonpoint source pollution would be expected to increase due to stormwater runoff from the proposed road (Section 4.1.1.3.A -- Surface Water Quality). The loss of the small area of tidal marsh would cause a minor reduction in the ability of the embayment to metabolize these pollutants. Reduced nutrient cycling and lower water quality in addition to increased pollution would further reduce the benthic organism productivity within this area. However, due to the small size of the area affected, this would not be a significant impact.

Considering the extent of mudflat and tidal marsh habitat in Cathlamet Bay, it would appear that the loss of habitats from the proposed road construction would have relatively minor effects upon estuarine processes. However, it is important to note that the proposed road construction would be in response to full utilization of North Tongue Point as a deep draft port facility. The potential impacts of this development are further discussed in Section 4.8 -- Cumulative Impacts.

**Fishes:** Impacts to fishes from Phase 1 of Alternative B would be the same as predicted for Alternative A. In addition to the development of South Tongue Point proposed in Alternative A, Phase 2 of Alternative B includes a road connection between South Tongue Point and North Tongue Point with a road constructed over approximately four acres of intertidal mudflat and tidal marsh habitat.

The loss of approximately four acres of forested and scrub/shrub wetland, mudflat, and tidal marsh habitat would affect those fish species using intertidal habitats. As noted above, the direct loss of habitat would reduce the amount of benthic food available to fish species. Tidal marsh is important rearing habitat for juvenile fish. Other than salmonids, the fish associated with this rearing habitat are relatively unimportant economically. Road construction would eliminate approximately four acres of tidal marsh which provides habitat for juvenile fish. Considering the amount of similar habitat in Cathlamet Bay, this is not expected to be a significant impact.

**Reptiles and Amphibians:** Impacts to reptiles and amphibians from Alternative B would be similar to those of Alternative A.

**Birds:** Impacts to birds from Phase 1 of Alternative B would be the same as Alternative A. In addition to the development of South Tongue Point proposed in Alternative A, Phase 2 of Alternative B includes a road connection between South Tongue Point and North Tongue Point with a road constructed over approximately four acres of forested and scrub/shrub wetland, intertidal mudflat, and tidal marsh habitat.

Wading birds, shorebirds, and bald eagles are the primary users of the habitats which would be lost due to road construction. Use by other bird species is sporadic (Section 3.1.2.2 -- Fish and Wildlife). The loss of this intertidal habitat would eliminate valuable foraging habitat for wading birds and shore birds. The vegetated upland/wetland edge which is proposed for fill is often preferred by wading birds. Although a new wetland/upland edge would be created by the road fill, traffic disturbance on the road would likely reduce the bird use of this edge. However, due to the abundance and close proximity of these habitats and associated food sources within the



area, it is unlikely birds species other than bald eagles (Section 4.1.2.2.B -- Threatened, Endangered and Sensitive Wildlife Species) would be adversely affected.

**Mammals:** Impacts to mammals from Phase 1 of Alternative B would be the same as predicted for Alternative A. In addition to the development of South Tongue Point proposed in Alternative A, Phase 2 of Alternative B includes a road connection between South Tongue Point and North Tongue Point with a road constructed over approximately four acres of forested and scrub/shrub wetland, intertidal mudflat, and tidal marsh habitat.

Wetland fill from road construction would likely displace a few mammal species such as nutria, muskrat, or raccoon which are dependant upon vegetated wetlands. Considering the abundance of similar undisturbed habitat in the vicinity, it is not expected that local mammal populations would be adversely affected.

#### Alternative C - No Action Alternative

No changes to benthic, zooplankton, fish, reptile and amphibian, bird, and mammal, populations would result from pursuing this alternative.

### **B. Threatened, Endangered, and Sensitive Wildlife Species**

#### Alternative A - Development of South Tongue Point

**Salmonids:** As discussed in Chapter 3.0 (Section 3.1.2.2.B -- Threatened, Endangered and Sensitive Wildlife Species), the Idaho fall chinook may use rearing habitat where piers and trestles are proposed for construction. As discussed below, the project would not be expected to have an adverse effect on salmonids. A Section 7 consultation between the Service and the National Marine Fisheries Service has been initiated to confirm this conclusion.

Considering the existing natural turbidity levels in the area, temporary increases in turbidity from the physical placement of piers should not affect the fish that use this habitat. Should piers eventually attract concentrations of amphipods, they would act as a food source. The spacing of the pilings would not encumber fish movements.

Assuming four piers and trestles at build-out, approximately 157,620 square feet of subtidal and intertidal mudflat area would be shaded (Section 4.1.2.1 -- Vegetation), but this shading should not adversely affect these fish because of the wide spacing of the pilings within each pier and the height of the pier above the water. Shaded areas may actually benefit these fish by providing them cover from predatory birds (Emmett, pers. comm., February 19, 1992).

As previously discussed, there is potential for hazardous material spills from the proposed uses at South Tongue Point (Section 4.1.1.8 -- Hazardous Materials). Under the operating procedures



required by State and Federal law, it is not expected spills would pose a significant threat to these fish.

Maintenance dredging to keep the navigation channel at 18 feet NGVD may be required during Phase 2 of Alternative A (Section 4.1.1.1.B -- Aquatic Topography). There has been concern expressed this activity would impact the biotic component of the area through the dispersion of potentially hazardous chemicals into the food chain, if such materials exist (Section 3.1.1.4.C -- Sediments). However, as discussed in Section 4.1.1.3.A (Surface Water Quality) and Section 4.1.1.8.B (Sediment Hazardous Materials), based on existing data for sediment sampling at both North Tongue Point and South Tongue Point, it is not expected that there are significant levels of contaminants in the sediments surrounding South Tongue Point. Further, if such contaminants do occur in the sediments, it is likely that they would be located at a minimum depth of 4 feet below the basin floor and would not be disturbed by dredging activities.

The Corps conducted sampling and analysis of sediments within the biotic zone of sediments near South Tongue Point in 1990 and 1992. The object of this sampling was to test for the presence of contaminants that could pose a hazard to bald eagles and other wildlife. These contaminants accumulate in fish, which are the major prey item for eagles. The samples were tested for heavy metals, pesticides (including DDE and DDT), polyaromatic hydrocarbons, and PCB. Results of the analysis indicated insignificant levels of these contaminants (Dorsey, pers. comm., 1992).

The main threats to Idaho fall chinook are reported to be upriver hydroelectric dams, irrigation diversion dams, water diversions, and loss of spawning habitat through post-logging soil erosion. Activities occurring in the Columbia River Estuary are not expected to adversely affect this species.

**Bald Eagles:** The development of South Tongue Point may have an adverse effect on resident bald eagles, a Federally listed Threatened species (Section 3.1.2.2.B -- Threatened, Endangered and Sensitive Wildlife Species). While the development of South Tongue Point would not result in the direct loss of critical habitat, the cumulative effect of activities associated with the development and subsequent land use of South Tongue Point would likely disrupt the wintering and resident bald eagles' foraging behavior in the vicinity of the project area. However, reasonable mitigation measures are available to compensate for the expected disturbance to eagles. These are included in Section 4.5 -- Mitigation Measures. A Section 7 consultation between the Service Realty Office and the Field Office has been initiated to confirm the conclusions of this EIS. Additional mitigation measures may be defined during this process.

The following text discusses:

1. Potential impacts to migrant bald eagles from:
  - (a) noise and human movement;
  - (b) boating activity;

- (c) contaminants.
- 2. Potential impacts to the resident bald eagles in the area of South Tongue Point from:
  - (a) noise and human activity;
  - (b) boating activity; and
  - (c) contaminants.
- 3. Potential impacts to adjacent bald eagle territories.

**1. Impacts to Migrant Bald Eagles**

- (a) **Impacts from noise and human movement to migrant bald eagles:**  
Noise impacts from construction can be considered to be temporary. For example, construction of the Navy facility is anticipated to take 10 to 12 months. This time frame includes approximately 7 weeks for piles and 4 months for the pier. Construction of facilities would take place as tenants leased portions of the site. However, it is anticipated that the entire South Tongue Point project would take approximately seven years to reach full build-out. Construction activity would be expected to be intermittent over this period.

The Washington State Department of Transportation (Bottorff et al., 1987) studied the effects of noise caused by pile driving and other construction on a resident bald eagle population at Orcas and Shaw Islands, Washington. Other noise source factors studied included ferry whistles, boat motors, chain saws, aircraft, and other construction noises including front-end loaders, cranes, generators, diesel trucks, hammers, and general unloading of supplies and equipment. These noise impacts are similar to those which would be expected during the construction at South Tongue Point.

Construction activities, including pile driving, emitted louder background noise levels than background levels of sound out to a distance between 0.25 and 0.5 miles from the island. Pile driving noise was not distinguishable from other noises by the noise meter. Between 0.25 and 0.5 miles from the construction site, construction noises were similar or equal to background noise. Beyond 0.5 miles, background noise exceeded the pile driving noise.

The 1987 study concluded that driving of wood piles did not visibly disturb eagles, as measured by departure or avoidance. It also concluded that wintering eagles that are accustomed to some human presence

probably are not disturbed by the driving of wooden piles when the construction was no closer than 0.25 miles from perch sites. The study further concluded that while noise may not be a factor within 0.25 miles, the activity associated with the noise may be a disturbance.

It is expected that barge fabrication activities would contribute approximately 20 to 32 dBA to existing daytime noise levels at South Tongue Point, and 32 to 38 dBA to the nighttime hours (Section 4.1.1.5 - Noise and Activity). Additions to local traffic noise would be insignificant. Noise levels in the vicinity of South Tongue Point would increase gradually over time with increasing development; however, traffic levels may decrease should the Astoria Bypass divert traffic before reaching the project area. It is impossible to predict if the change in noise level over time would adversely effect eagles. There are no known acceptable noise levels for bald eagles (Bottorff et al., 1987).

It is likely that the construction of the piers and subsequent human activity would preclude the use of the intertidal area directly east of South Tongue Point by foraging eagles. It is possible that eagles might use the piers for perching as occurs at North Tongue Point, but the amount of human activity planned for the piers makes this scenario unlikely. This area has been used by foraging eagles on an occasional basis (Watson and Anthony, 1986) and the loss of use of this area would not be significantly detrimental.

The intertidal zone at the mouth of the John Day River has been frequently used by foraging bald eagles, although not nearly to the extent of the Mill Creek embayment or Lois Island (Watson and Anthony, 1986). Eagles have traditionally used three perch trees at South Tongue Point in addition to perching extensively on John Day Point. Although no perch trees would be lost to development, it is likely eagles would avoid using the cottonwood nearest the proposed Navy pier due to the proximity to human pedestrian traffic required for operation of the two minehunter coastal craft. It is also likely the eagles would avoid using the perch tree at the south end of the southern intertidal marsh and at the north end of the peninsula.

Eagles would be able to see human activity from these perch trees, which is likely to cause them to seek more secluded areas for perching. Seeking perch sites away from the John Day intertidal area and Mill Creek embayment would likely reduce the availability of foraging areas for wintering bald eagles in the area. Reductions in use of the Mill Creek

embayment and John Day foraging areas may increase competition within other foraging areas by wintering bald eagles.

The majority of wintering bald eagles prefer using areas to the east of the project area for roosting, perching, and foraging (Watson and Anthony, 1986). Since wintering eagles do not depend upon the South Tongue Point area for roosting, perching, and foraging to the same degree as other areas within Cathlamet Bay, the expected reduced use of the foraging areas at South Tongue Point does not appear to be a significant loss to the migrant population of eagles.

- (b) **Impacts of boating activity on migrant bald eagles:** Boat activity is not expected to increase appreciably beyond present boating activity levels. The Navy plans on having two vessels; the first to be deployed in 1993 and the second in 1995. These ships are projected to leave and return to port once a week. The Navy would not be regulating other boat traffic in the area.

The launching of one barge per month at the proposed barge fabrication site would not significantly contribute to boat traffic. The Corps Astoria Field Station boat activities are not anticipated to change from present levels. Should Clatsop Community College locate its vessel at South Tongue Point, it is expected that it would leave and return to port once a day. At full build-out, it is anticipated that there would be a maximum of three vessels operating in the area at any one time.

The present levels of boating activity create some disturbances for eagles (McGarigal et al., 1991), but do not appear to significantly reduce the use of the South Tongue Point area for foraging. Most existing activity is recreational boating and commercial fishing operations. Recreational boating has been increasing in the area; however, it is difficult to predict if this trend would continue. The potential of additional protection for threatened and endangered fish species are unknown factors which could affect recreational and commercial boating activity. It does not appear that the boating activity resulting from development of South Tongue Point would be a significant increase over present levels.

- (c) **Impacts from contaminants to migrant bald eagles:** As discussed in Section 4.1.1.3.A (Surface Water Quality), all project area surface runoff would be directed through biological stormwater runoff treatment facilities, thereby eliminating direct discharges to the estuary and greatly reducing the potential of contaminants entering the food chain and adversely affecting eagles. As discussed in Section 4.1.1.8 (Hazardous



Materials), the potential exists for accidental spills. All tenants at South Tongue Point would be required to have an approved spill response plan. The potential for contaminants from the South Tongue Point project to adversely affect bald eagles should be low. Eagles are suspected to be threatened by DDE and PCBs; potential project area contaminants are more likely to consist of hydrocarbon materials such as fuels and oils, which would be limited by the use of oil traps at the outfall structures (Section 4.5 -- Mitigation Measures).

Maintenance dredging to keep the navigation channel at 18 feet NGVD may be required during Phase 2 of Alternative A (Section 4.1.1.1.B -- Aquatic Topography). There has been concern expressed this activity would impact the biotic component of the area through the dispersion of potentially hazardous chemicals into the food chain, if such materials exist (Section 3.1.1.4.C -- Sediments). However, as discussed in Section 4.1.1.3.A (Surface Water Quality) and Section 4.1.1.8.B (Sediment Hazardous Materials), based on existing data for sediment sampling at both North Tongue Point and South Tongue Point, it is not expected that there are significant levels of contaminants in the sediments surrounding South Tongue Point. Further, if such contaminants do occur in the sediments, it is likely that they would be located at a minimum depth of 4 feet below the basin floor and would not be disturbed by dredging activities.

The Corps conducted sampling and analysis of sediments within the biotic zone of sediments near South Tongue Point in 1990 and 1992. The object of this sampling was to test for the presence of contaminants that could pose a hazard to bald eagles and other wildlife. These contaminants accumulate in fish, which are the major prey item for eagles. The samples were tested for heavy metals, pesticides (including DDE and DDT), polyaromatic hydrocarbons, and PCB. Results of the analysis indicated insignificant levels of these contaminants (Dorsey, pers. comm., 1992).

This limited sampling suggests that near-surface sediments in the South Tongue Point are not contaminated; however, if channel maintenance dredging becomes necessary, additional detailed environmental studies would be necessary to assess any potentially adverse effects on bald eagles (as well as other fish and wildlife). It is expected that if contaminated sediments were to be found, the Corps would dredge and dispose of them in a manner consistent with all appropriate procedures and regulations. If, as expected, sediments were found to be clean, then it is expected that

the dredge material would be deposited on spoil islands in the vicinity or be transported for ocean disposal.

## 2. Impacts to Resident Bald Eagles

- (a) **Impacts from noise and human movement to resident bald eagles:** The proposed South Tongue Point development project is within the territory of the Mill Creek bald eagle pair (Watson and Anthony, 1986). Human activity would increase substantially on South Tongue Point as a result of the proposed project (Section 4.1.1.5 -- Noise and Activity). During construction, high levels of human activity would be expected with associated noise. At project build-out, approximately 400 people may enter and leave the site each day during typical working hours.

Studies on eagle disturbance (McGarigal et al., 1991; Bottorff et al., 1987) conclude that eagles within 0.25 miles are disturbed by activities such as those proposed for South Tongue Point. However, there have been numerous studies of bald eagle ecology and behavior in the lower portion of the Columbia River, including of the Mill Creek pair (Section 3.1.2.2.B -- Threatened, Endangered, and Sensitive Wildlife). It is apparent from the results of these studies that eagle behavior can vary greatly from pair to pair and location to location, especially in tolerance to disturbances. Because of this variability in behavior, most eagle experts feel that it is difficult or impossible to make predictions about the response of eagles to new disturbances. Typically, the management recommendations that result from the studies reflect this variability by being very general and conservative, and, occasionally, speculative. It is impossible to predict how the Mill Creek pair would habituate to the increased levels of human activity at South Tongue Point. Past studies suggest they may adapt to the changes, but the threshold of tolerance for this pair is not known. The following discussion reflects the current understanding of this pair and of eagle tolerances to disturbances.

The Mill Creek pair primarily forages at the Mill Creek embayment, Taylor Sands, and the tidelands on the west sides of Lois and Mott islands. There does not appear to be a lack of foraging areas for this resident breeding pair (Watson and Anthony, 1986; McGarigal et al., 1991). This eagle pair reportedly prefers to forage in the early morning hours and at low tides (Watson and Anthony, 1986). It has also been noted that the Mill Creek pair appears to be more tolerant of human activities than other area eagles (Watson and Anthony, 1986).

During winter, the Mill Creek pair forages mostly at the Mill Creek embayment, John Day Point, and Tongue Point (Watson and Anthony, 1986). Considering the typically inclement weather occurring during this time of the year, human outdoor activity at South Tongue Point would likely be at a minimum. The times of peak human movement (arriving and leaving the work site) are not expected to often coincide with the resident eagles' preferred foraging times. Therefore, eagles should be subjected to only occasional human disturbance during the time of the year when they are using the South Tongue Point area for winter foraging.

The intertidal zone at the mouth of the John Day River has been frequently used by foraging bald eagles, although not nearly to the extent of the Mill Creek embayment or Lois Island (Watson and Anthony, 1986). Both migrant and resident bald eagles have traditionally used three perch trees at South Tongue Point in addition to perching extensively on John Day Point. Although no perch trees would be lost to development, it is likely eagles would avoid using the cottonwood nearest the proposed Navy pier due to the proximity to human pedestrian traffic required for operation of the two minehunter coastal craft. It is also likely the eagles would avoid using the perch tree at the south end of the southern intertidal marsh and at the north end of the peninsula.

Eagles would be able to see human activity from these perch trees, which is likely to cause them to seek more secluded areas for perching. Seeking perch sites away from the John Day intertidal area and Mill Creek embayment would likely reduce the use and foraging efficiency of bald eagles in this area. Reductions in use of the Mill Creek embayment and John Day foraging areas may increase competition within other foraging areas by wintering bald eagles. Appropriate mitigation for the loss of these perch sites would be erection of perch piling within these intertidal areas at least 12 feet in height, but not at a height where human activity is visible to the eagles (Garrett et al., 1988).

It is not expected that development activities at South Tongue Point would significantly disturb nesting activities of the Mill Creek pair. The Mill Creek pair appears to be more tolerant of local human activities than other area eagles (Watson and Anthony, 1986). Recent studies (McGarigal et al., 1991; Bottorff et al., 1987) indicate that eagles are most visibly disturbed by noise and human activities occurring within 0.25 mile. The Mill Creek pair nest is more than 0.5 mile away from the proposed construction site. Considering conclusions of the Bottorff study (1987), background noise at the nest site would exceed construction noise levels on the peninsula. The nest site is also farther away than the 0.25 mile,

which was cited as the average avoidance distance eagles had shown towards disturbance during foraging (McGarigal et al., 1991). The Mill Creek pair shows a decided preference for foraging at Taylor Sands during the breeding season rather than at South Tongue Point (Watson and Anthony, 1986). There is no reason to assume this preference would not continue during and after development at South Tongue Point.

Considering the moderate human activity levels projected for the northern end of the peninsula and the extent of the setback between the proposed buildings and the Mill Creek embayment mud flats, it seems unlikely that eagles would be subjected to significantly greater disturbances than currently exist in the embayment.

Construction activity and its associated noise is expected to most adversely affect the resident eagles' foraging behavior during breeding. Construction activity should not coincide with the Mill Creek pair's preferred foraging times, which are typically in the early morning (McGarigal et al., 1991). However, it is expected that construction activities would deter the eagle pair from using the Mill Creek embayment, John Day intertidal area, or the perch sites on John Day Point when construction is in progress. Although the South Tongue Point area is not the preferred foraging area during breeding season, a substantial portion of the Mill Creek pair's energy budget is spent foraging in this area (Watson and Anthony, 1986; Garrett et al., 1988).

Foraging efficiency is a critical factor in the success of fledging eaglets. It is critical for the female eagle to have adequate nourishment during incubation and for the eaglets to receive sufficient nourishment during growth and fledging. It is highly likely that construction activities would cause the Mill Creek eagles to forage farther away from the nest site than they do at the present time. The reduction in breeding eagle foraging efficiency caused by avoidance of construction disturbance could well contribute to failure of eaglets to fledge. If construction activities or schedules are modified so that eagle foraging is not disturbed during breeding season, then eagles should be able to provide their young with adequate food supplies.

As discussed above, under Impacts to Migrant Bald Eagles, the maintenance dredging that may be required during Phase 2 of Alternative A is not expected to disturb sediments containing significant levels of contaminants (Section 4.1.1.1.B -- Aquatic Topography, Section 3.1.1.4.C -- Sediments, Section 4.1.1.3.A -- Surface Water Quality, and Section 4.1.1.8.B -- Sediment Hazardous Materials). The Corps' analysis of



samples taken within the biotic zone of sediments near South Tongue Point indicated insignificant levels of the contaminants most likely to have an adverse effect on eagles (heavy metals, pesticides, polyaromatic hydrocarbons, and PCB) (Dorsey, pers. comm., 1992).

- (b) **Impacts of boating activity on resident bald eagles:** The Mill Creek pair does not tolerate boats within the Mill Creek embayment but does tolerate boats using waters off North Tongue Point (Watson and Anthony, 1986). As stated above, boating activity is not expected to change substantially as a result of project development; therefore, these resident eagles should not be subjected to increased disturbance by boats.
- (c) **Impacts from contaminants on resident bald eagles:** There is a greater chance of contaminants from the South Tongue Point project affecting resident eagles because of the amount of time they spend in the area. As discussed above, the chances of contaminants entering the estuary from the South Tongue Point project would be small. As with the migrant bald eagles, resident eagles are known to be threatened by DDE and PCBs; potential project area contaminants are more likely to consist of hydrocarbon materials such as fuels and oils.

### 3. Impacts to Adjacent Bald Eagle Territories

Development at South Tongue Point would occur within the home range of the Mill Creek pair (Watson and Anthony, 1986). John Day Point is the territorial boundary between the Mill Creek pair and the Twilight pair. Disturbance from construction and operation of the South Tongue Point project could preclude the Mill Creek pair from using a portion of their territory and from using the key territorial boundary point between territories. Reductions in use of this area by the Mill Creek pair may lead to altered territorial boundaries and eventual abandonment of the area by the Mill Creek pair.

In addition, the population of bald eagles in Oregon is reportedly increasing and pairs are establishing new nesting territories in all parts of the state (Isaacs and Anthony, 1991). In the South Tongue Point area, there is the potential for nesting pairs to establish new territories on or near the John Day Point, Tongue Point, or Mott Island. If one or more new territories were to be established, the result would most likely be changes in the existing patterns of habitat use (Isaacs, pers. comm., 1992). Development at South Tongue Point and the associated disturbance to eagle foraging habitat may limit new territory establishment and eagle population growth in the area.

### Alternative B - Development of South Tongue Point with Road Connection to North Tongue Point

**Salmonids:** Impacts to salmonids from Phase 1 of Alternative B would be the same as for Alternative A.

As discussed in the description of Alternative B impacts to fishes in Section 4.1.2.2.A, the loss of approximately four acres of forested and scrub/shrub wetlands, mudflat, and tidal marsh habitat would affect those fish species using intertidal habitats. The direct loss of habitat would reduce the amount of benthic food available to fish species. Tidal marsh is important rearing habitat for juvenile fish. Road construction would eliminate approximately four acres of tidal marsh which provides habitat for juvenile fish. Because of the abundance of similar habitat in the project area, this is not expected to be a significant impact.

Cumulative impacts are discussed in Section 4.8, below. In general, Idaho fall chinook are more threatened by upriver hydroelectric dams, irrigation diversion dams, water diversions, and loss of spawning habitat through post-logging soil erosion than activities occurring in the Columbia River Estuary.

**Bald Eagles:** Impacts to bald eagles from Phase 1 of Alternative B would be the same as for Alternative A.

Phase 2 of Alternative B includes the construction of a connecting road between South Tongue Point and North Tongue Point. The construction of this road and subsequent vehicle use would very likely disrupt eagle foraging in the Mill Creek embayment to the point where eagles would abandon using this area. The loss of this foraging area and local foraging efficiency may well reduce the breeding success of the Mill Creek pair, which would be a significant adverse impact.

### Alternative C - No Action Alternative

This alternative would not adversely affect either salmonids or bald eagles. It is primarily activities upriver which affect these species, rather than current activities within Cathlamet Bay.

Contaminants in Columbia River water adversely affecting the food source of eagles are suspected as the primary agents determining the low level of bald eagle nesting success in the area (Garrett et al., 1988; Ingels, 1989). There may be an increase in bald eagle population in the project vicinity because of the potential for additional nesting pairs to establish new territories in the area. Adequacy of prey base is one of the major factors determining the successful establishment of new territories. It is not known if the present prey base is adequate to support additional eagle territories (Isaacs, pers. comm., 1992).

Salmonid populations are primarily adversely affected by upriver hydroelectric dams, irrigation diversion dams, water diversions, and loss of spawning habitat through post-logging soil erosion. Therefore, salmonids would continue to be affected by these activities.

### **4.1.3 CULTURAL AND SOCIAL ENVIRONMENT**

#### **4.1.3.1 Land Use**

##### **Alternative A - Development of South Tongue Point**

The land use pattern on South Tongue Point would change from a relatively undeveloped site to an urban, industrial development.

The existing uses in the vicinity of the project consist of the Corps Astoria Field Station on South Tongue Point, several residences located west of South Tongue Point, and industrial uses at North Tongue Point. The intersection of U.S. Highway 30 and the new access road would require a partial reconfiguration of the driveway leading to the private residence located in the southwest quadrant formed by that intersection.

There would be no restrictions on commercial and sport boating resulting from Alternative A, except in the immediate vicinity of the piers. Alternative A would not alter the continuity of any of the existing uses.

##### **Alternative B - Development of South Tongue Point with Road Connection to North Tongue Point**

Impacts to existing uses resulting from implementation of Alternative B would be the same as from Alternative A, except the new road connection would provide a potential benefit to North Tongue Point uses.

##### **Alternative C - No Action Alternative**

Alternative C would not cause any changes to existing uses on or in the vicinity of South Tongue Point.

#### **4.1.3.2 Socioeconomic**

The IMPLAN (Impact Analysis for Planning) input-output model was used as the primary tool for estimating the population, housing, employment, and fiscal impacts of the project (University of Minnesota, 1991). The employment, income and output multipliers estimated by the IMPLAN model are based on data describing the structure of the national and regional economies as of 1985. Since the IMPLAN model is designed to estimate the effects of changes in employment and output on regional economies, the population and housing impacts derived

from the model do not explicitly consider local demographic and housing market factors such as the age distribution of the population, migration patterns, or housing market constraints such as the availability of developable land.

Because a fraction of the new jobs would most likely be filled by presently unemployed workers in Clatsop County and other nearby communities, the net employment impacts of the project would be somewhat less than the gross estimate of 610 jobs. For example, if the project reduced the average 1990 unemployment rate for Clatsop County of 6.4 percent down to the 1990 statewide average of 5.5 percent by providing jobs for presently unemployed people, the net permanent employment impact of the project could be reduced to approximately 450 jobs. In addition, the employment impact on the nearby area could be influenced by the relocation of employees from other areas of Oregon.

However, since a multiplicity of complex factors would influence the relationship between the jobs created by the proposed alternatives and unemployment in Clatsop County and other nearby communities, the population, housing, and job impacts are not adjusted. These factors include the skills of unemployed workers relative to the job requirements of tenants at South Tongue Point; the continuing evolution of the national and regional economies; and new economic development that would occur in Clatsop County independent of the proposed development.

Market absorption of the project was assumed to take six years, beginning with Navy occupancy during project year two and concluding with the lease of the general development parcel in project year seven. Since the economic and employment characteristics of some project tenants are not well defined at this time, the actual socioeconomic impacts of Alternative A may differ from estimates reported here. The actual number of jobs created by government or business siting opportunities available at South Tongue Point are highly dependent on the decisions of government agencies and firms to move to the project site.

The annual impacts of the proposed development were estimated with an assumed parcel-by-parcel absorption pattern that is based on an assessment of the comparative advantage of each parcel relative to comparable property along the lower portion of the Columbia River and the extent to which prospective tenants have expressed an interest in locating at South Tongue Point.

Since the socioeconomic impacts of the project are expected to extend beyond Clatsop County, the IMPLAN model was used to estimate to the extent possible, the impacts occurring within Clatsop County, and for the greater Portland area (Clatsop, Tillamook, Columbia, Washington, Multnomah, and Clackamas counties).



## A. Population

### Alternative A - Development of South Tongue Point

The total permanent population impacts of the proposed development are projected to be approximately 1,300 persons by project lease-out. These population estimates are based on an average household size of 2.1 persons per project employee as derived from the IMPLAN model. In addition, jobs created during project construction would support a transient population that ranges from about 739 persons in project year one to 573 persons in project year six. Since the construction jobs associated with the project are not permanent, these positions would probably be filled by construction workers already residing in Clatsop County or commuters from nearby communities, with negligible permanent population impacts.

The permanent population impacts are summarized in Figure 4-1 for the 20-year study period. As shown in Figure 4-1, the permanent population impacts range from about 353 persons in project year two, the first year of occupancy by the U.S. Navy, to 1,300 persons at project lease-out.

Of the total increase of 1,300 persons, approximately 1,100 are projected to reside in Clatsop County, and the remaining 200 are expected to reside in the greater Portland area. Given the limited availability of developable land for residential development in Astoria, it is likely that much of the population increase attributable to the proposed development would occur in other areas of Clatsop County such as Warrenton.

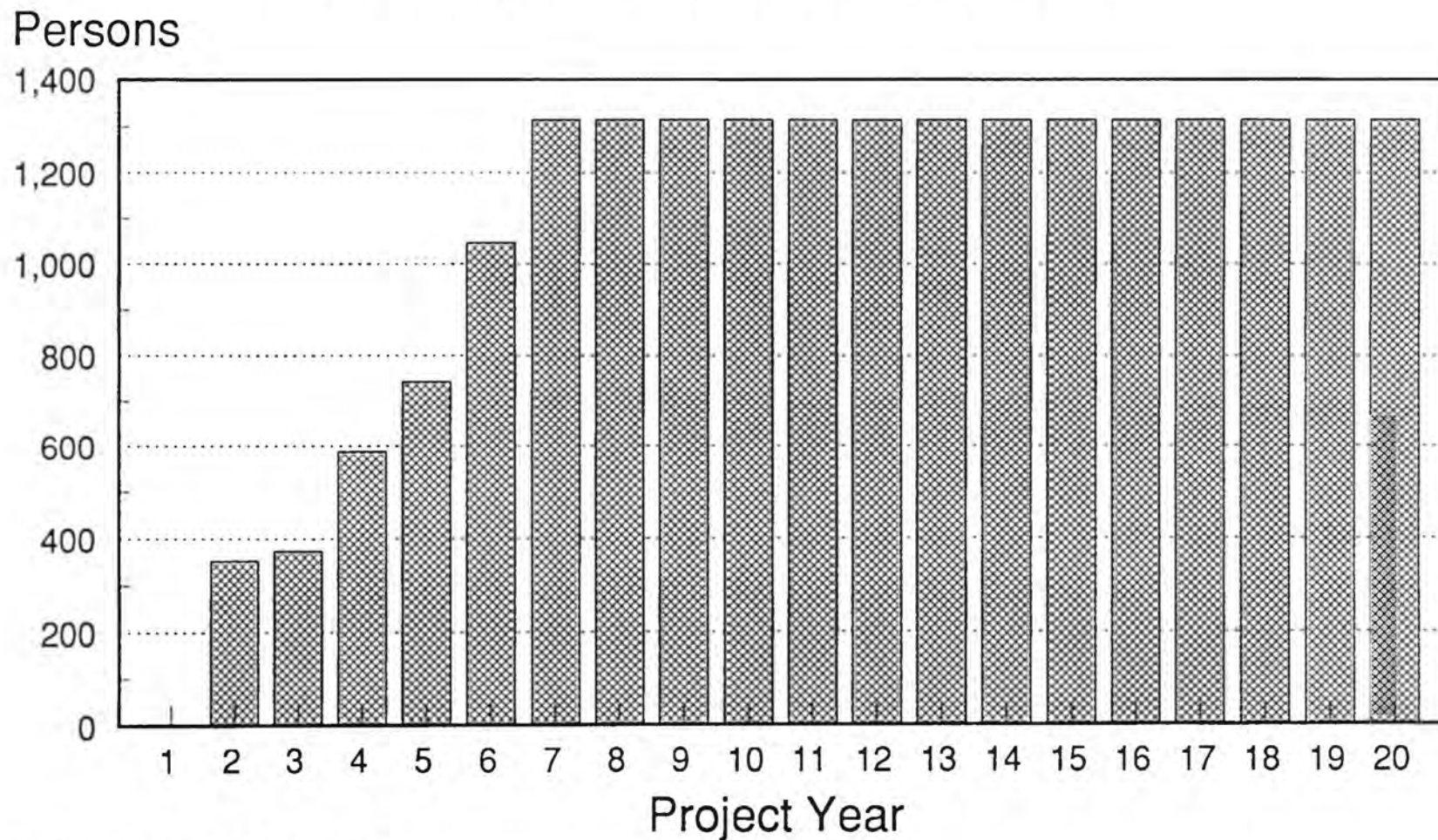
### Alternative B - Development of South Tongue Point with Road Connection to North Tongue Point

Since the connection to North Tongue Point is not expected to directly influence the development of South Tongue Point, the population impacts are not likely to differ from the estimates for Alternative A. However, the presence or absence of the connection may affect the socioeconomic impacts associated with the development of North Tongue Point.

### Alternative C - No Action Alternative

Although Alternative C would not generate any changes in the population of Astoria or Clatsop County, it is likely that population growth would continue as a consequence of economic development along the north Oregon coast and in other areas of Clatsop County. For example, the Oregon State Employment Division projects an increase of 7,300 jobs in the Clatsop, Columbia, Lincoln, and Tillamook counties between 1989 and 2000, or about 15,330 persons assuming 2.1 residents per job (Oregon State Employment Division, 1990). Alternatively, the Bonneville Power Administration projects a population increase of 2,100 persons in Clatsop County by 2000 and an additional 2,500 persons by 2010 (Bonneville Power Administration, 1990).

## CLATSOP COUNTY & GREATER PORTLAND AREA



Hamilton, Rabinovitz & Alschuler

Figure 4-1  
**POPULATION IMPACTS**  
**SOUTH TONGUE POINT EIS**  
June 19, 1992

## B. Housing

### Alternative A - Development of South Tongue Point

The total permanent housing demand created by the proposed development is projected to total about 555 renter- and owner-occupied units by project lease-out. The number of households attributable to the proposed development was estimated based on permanent project employment and adjusted for households with multiple wage earners. The adjustment for households with multiple wage earners was made using employment and household data collected by the Bonneville Power Administration which indicate that the average household in Clatsop County has 1.1 wage earners.

The permanent housing impacts are summarized in Figure 4-2, for the 20-year study period. As shown in Figure 4-2, the permanent housing impacts range from about 91 units in project year two, the first year of occupancy by the U.S. Navy, to 555 units at project lease-out. Of the total increase of 555 units, approximately 478 are projected to be built in Clatsop County, and the remaining 77 are expected to be built in the greater Portland area. Given the limited availability of developable land for residential development in Astoria, much of the housing development may occur in other areas of Clatsop County such as Warrenton. However, it should be recognized that the City of Astoria has lost population from its peak, and an under-utilized infrastructure exists within the City boundaries. A portion of the required housing could, therefore, be accomplished through redevelopment.

### Alternative B - Development of South Tongue Point with Road Connection to North Tongue Point

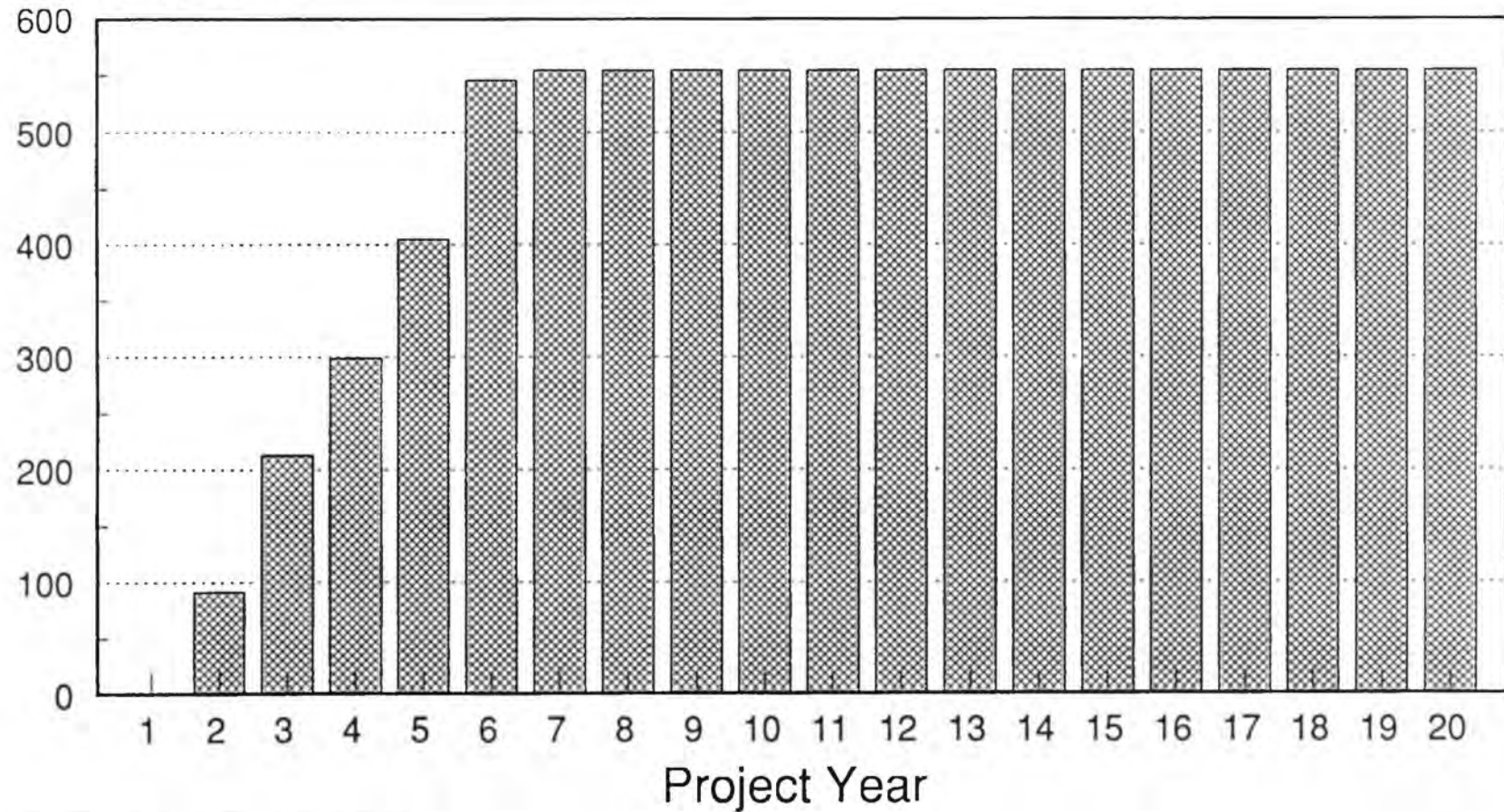
Since the connection to North Tongue Point is not expected to directly influence the development of the proposed development, the housing impacts are not expected to differ from the estimates for Alternative A. However, the presence or absence of the connection may affect the socioeconomic impacts associated with the development of North Tongue Point.

### Alternative C - No Action Alternative

Although Alternative C would not generate any changes in the demand for housing in Astoria or Clatsop County, it is likely that housing demand would continue to grow as a consequence of economic development along the north Oregon coast and in Clatsop County as discussed above.

CLATSOP COUNTY & GREATER PORTLAND AREA

Housing Units



Hamilton, Rabinovitz & Alschuler

Figure 4-2  
**HOUSING IMPACTS**  
**SOUTH TONGUE POINT EIS**  
June 19, 1992



## C. Employment

### Alternative A - Development of South Tongue Point

Three types of employment impacts--direct, indirect, and induced--are typically created by new economic activities such as the proposed development for South Tongue Point. Direct employment impacts are those directly associated with the tenant operations at the project site (e.g., U.S. Navy personnel). Indirect employment is generated by the demand for intermediate goods and services created by new organizations or firms locating at South Tongue Point (e.g., fuel purchases, equipment repairs). Induced employment is generated by the increased household income and spending that accompanies the new direct and indirect employment (such as purchases of food and related household goods by Navy households).

As discussed above, the IMPLAN model was used to estimate the employment generated by the construction of the proposed development and by the public organizations and firms that are expected to occupy developed space at the site. The total employment impacts of the project (measured as full time equivalents) are summarized in Figure 4-3 for the 20-year study period. The employment impacts range from about 350 persons during construction in project year one to a constant 610 or so jobs by project year seven. From project year two to project year six, about 200 construction jobs are created, while the growth in tenant employment increases from about 125 workers in project year two to 610 workers by lease-out. Of the total increase of 610 workers, 405 are classified as direct employment, 65 as indirect employment, and the remaining 140 as induced employment. Five hundred and twenty-five of the workers are projected to be employed in Clatsop County, and the remaining 85 are expected to be employed in the greater Portland area.

As noted above, since some of the jobs may be filled by unemployed workers, total net new job creation may be somewhat less than the estimates reported in Figure 4-3. However, the direct job impacts were estimated conservatively. For example, one of the possible tenants, a marine fabrication facility, has the option of running either a one- or two-crew operation, depending on the market. For the purpose of these impact projections, the marine fabrication facility was assumed to operate with one crew. Assuming operations with two crews would increase projected direct, indirect, and induced employment by approximately 100 jobs. Therefore, the reduction in net new jobs due to unemployment and job relocation to Clatsop County are not likely to be significant relative to the likely variation in the total employment impacts.

### Alternative B - Development of South Tongue Point with Road Connection to North Tongue Point

Since the connection to North Tongue Point is not expected to directly influence the development of South Tongue Point, the employment impacts are not likely to differ from the estimates for Alternative A. However, the presence or absence of the connection to may affect the socioeconomic impacts associated with the development of North Tongue Point.

### Alternative C - No Action Alternative

Although Alternative C would not generate any changes in employment in Astoria or Clatsop County, it is likely that employment would grow in the absence of the project due to continued economic development along the north Oregon coast and in Clatsop County as discussed above.

### **D. Fiscal**

#### Alternative A - Development of South Tongue Point

The IMPLAN model also produces estimates of employee income that were used to estimate State income tax revenues generated by project-related employment. The income tax estimates are summarized in Figure 4-4 over the 20-year study period. At the time of project lease-out, the revenues are expected to run about \$400,000 per year. An average effective tax rate of 3.5 percent was used to calculate income tax revenues. This tax rate corresponds to the average employee income for all direct, indirect and induced employment of approximately \$16,000. (The average tax rate was obtained from unpublished summary tax return statistics for Clatsop County in 1989, which are prepared by the Oregon State Department of Revenue.)

Increases in property tax revenues generated by the project were estimated using actual tax rates for property located in Astoria, the valuation of the land and planned improvements located on taxable parcels on the site (\$45 million), and an estimated value for new residential development in Clatsop County (478 housing units valued at \$55,000/unit, net of land costs).

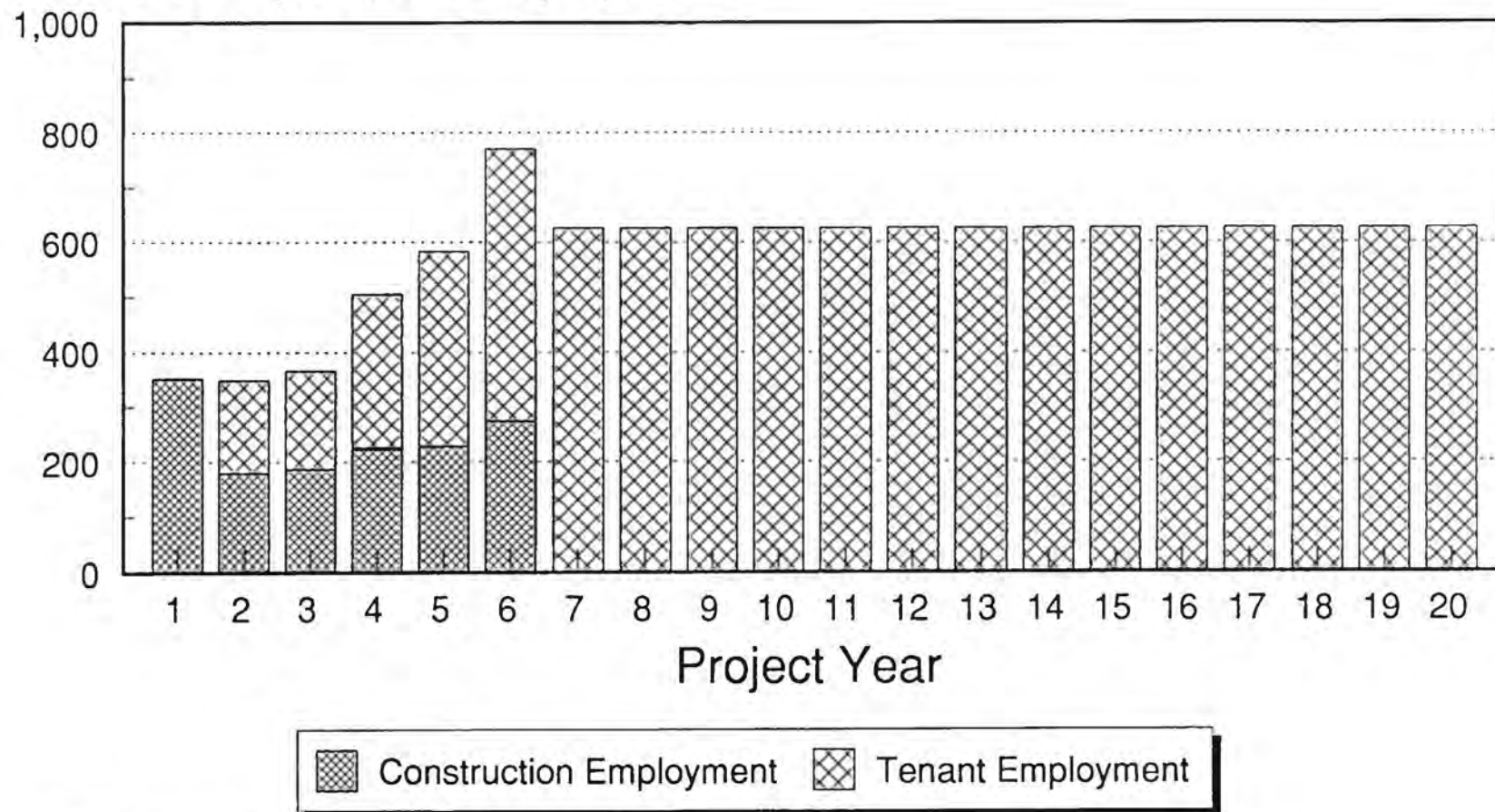
As summarized in Figure 4-5, the project is expected to increase property taxes in Clatsop County by about \$1.1 million. The effect of the project on property tax revenues received by jurisdictions in Clatsop County varies considerably, but as shown in Figure 4-5, the bulk of the revenues accrue to the City of Astoria and the local school districts. Revenues created by new residential development are not allocated by jurisdiction since its location is uncertain, and most of the development would probably not occur in Astoria.

Since Astoria, Clatsop County and other local jurisdictions are well above the Measure 5 cap, property taxes were estimated at project lease-out using the terminal Measure 5 tax rate cap of \$15 per \$ 1,000 of assessed valuation. The revenue calculations were made using the rate allocation for property located inside the City of Astoria since the project site is expected to be annexed into the City.

#### Alternative B - Development of South Tongue Point with Road Connection to North Tongue Point

Since the connection to North Tongue Point is not expected to directly influence the development of the proposed development, the fiscal impacts of Alternative B are not likely to differ from

CLATSOP COUNTY & GREATER PORTLAND AREA  
Full-Time Equivalent Employment



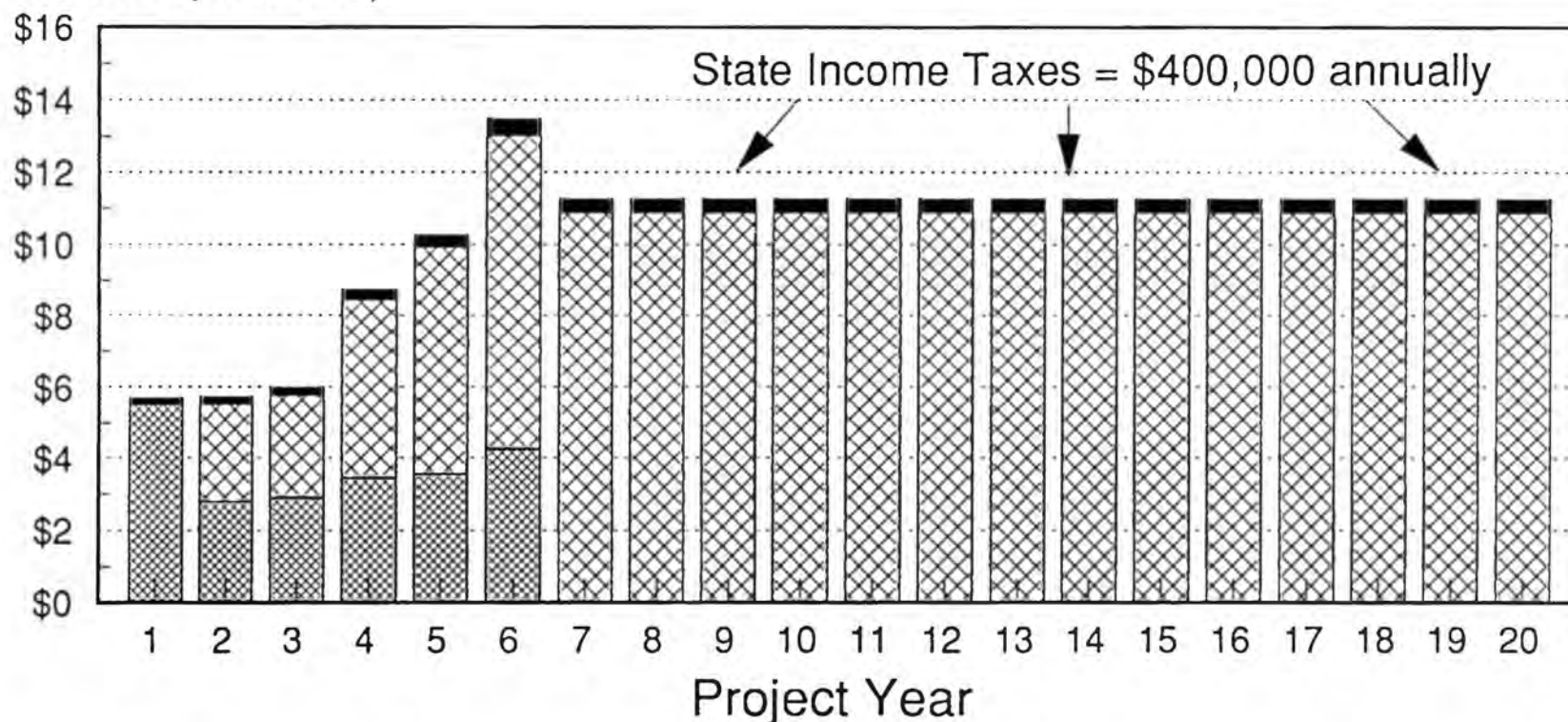
Hamilton, Rabinovitz & Alschuler

Figure 4-3  
DIRECT, INDIRECT, INDUCED  
EMPLOYMENT IMPACTS  
SOUTH TONGUE POINT EIS

June 19, 1992

# CLATSOP COUNTY & GREATER PORTLAND AREA -- 1991 \$

Dollars (millions)



Construction Emp. Income
  Tenant Emp. Income
  State Income Taxes

Hamilton, Rabinovitz & Alschuler

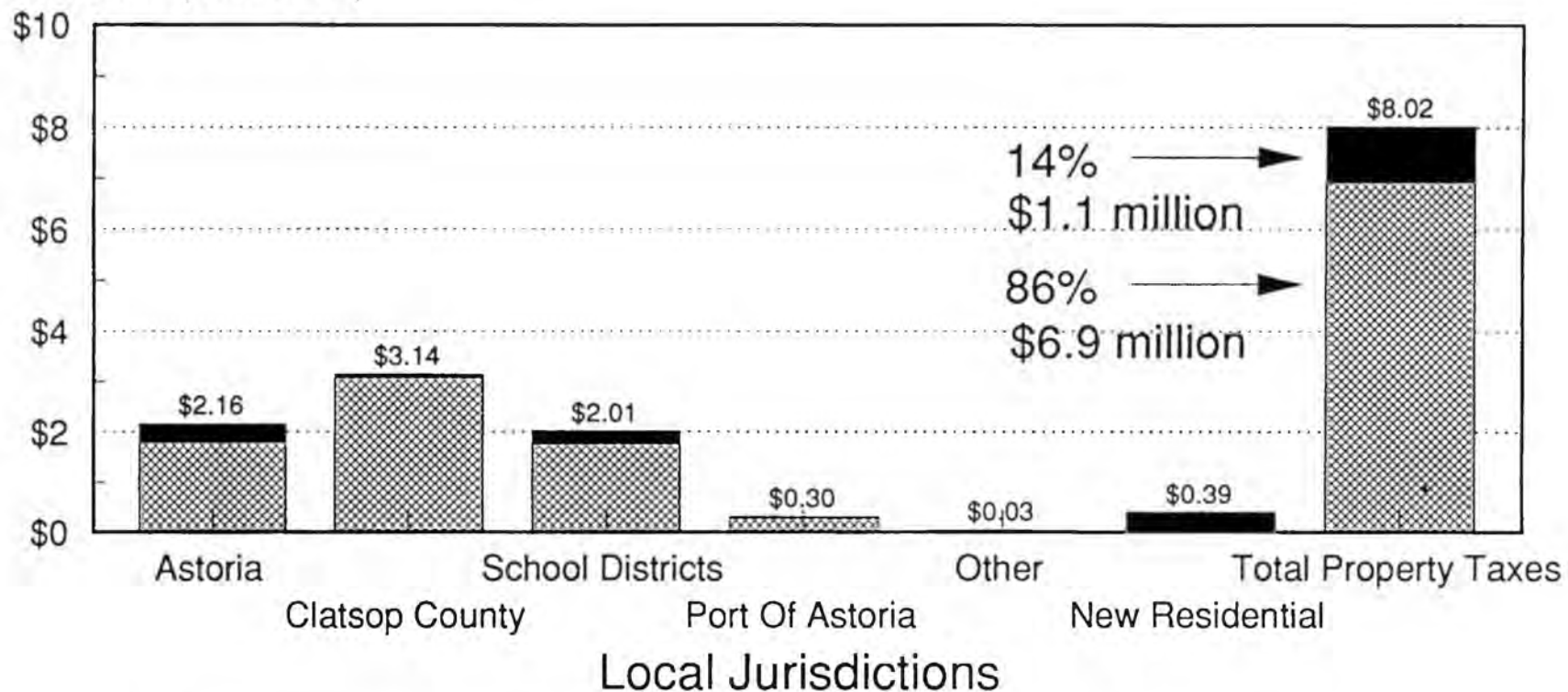
Figure 4-4  
 DIRECT, INDIRECT, INDUCED  
 INCOME IMPACTS  
 SOUTH TONGUE POINT EIS

June 19, 1992



# CLATSOP COUNTY JURISDICTIONS -- 1991 \$

Dollars (millions)



Existing FY 91 Property Taxes    Project Related Property Taxes

Hamilton, Rabinovitz & Alschuler

Figure 4-5  
PROPERTY TAX REVENUE  
IMPACTS AT LEASE OUT  
SOUTH TONGUE POINT EIS

June 19, 1992

the estimates for Alternative A. However, the presence or absence of the connection to may affect the socioeconomic impacts associated with the development of North Tongue Point.

#### Alternative C - No Action Alternative

Although Alternative C would not generate any changes in fiscal condition of the State of Oregon or local jurisdictions within Clatsop County, it is likely that the fiscal condition of these jurisdictions would change due to continued economic development of the State, the north Oregon coast and Clatsop County. However, the fiscal contribution of other projects would be greatly reduced compared to the proposed development at South Tongue Point.

#### **4.1.3.3      Cultural and Archeological**

##### Alternative A - Development of South Tongue Point

Alternative A would have no adverse effects on historic or archeological resources on the site, since none have been identified on South Tongue Point, and Site No. 35CLT54 is not within the project boundaries for Alternative A.

##### Alternative B - Development of South Tongue Point with Road Connection to North Tongue Point

Effects on historic and archeological resources from implementation of Phase 1 of Alternative B would be the same as for Alternative A. During Phase 2, work at the mouth of Mill Creek would be monitored to insure that any resources that might remain at Site No. 35CLT54, or other archeological resources, would not be impacted.

#### Alternative C - No Action Alternative

As with the other two alternatives, there would be no impacts to historical or archeological resources from Alternative C.

#### **4.1.3.4      Visual Resources**

##### **A.      Views of and from the Site**

##### Alternative A - Development of South Tongue Point

**Views of the Site:** Alternative A would change the views of the site from surrounding areas, as portions of the existing vegetation are replaced by low buildings, paved areas, and landscaping. The four new piers would also alter the appearance of South Tongue Point from the surrounding water. The site would be lit at night, and so would be visible from portions of U.S. Highway 30. The night-lighting would also be visible from neighboring houses, although

the vegetation between the homes and the site would provide screening. The night-lighting would be visible from the water.

The South Tongue Point site would be heavily landscaped, and areas of existing vegetation would be retained around the site perimeters, especially at the north and south end (Figure 2-4). It is expected that the Alternative A would have a significantly more aesthetically pleasing visual impact than other local industrial uses on North Tongue Point. Impacts to views of the site as a result of implementation of Alternative A would not be significant.

**Views from the Site:** Except for the addition of four piers to the immediate foreground view, Alternative A would have no effect on views from the site.

#### Alternative B - Development of South Tongue Point with Road Connection to North Tongue Point

Impacts to views of and from the site resulting from Phase 1 of Alternative B would be the same as those of Alternative A. In Phase 2, the road connection between South Tongue Point and North Tongue Point would also be visible from portions of South Tongue Point and from the water.

#### Alternative C - No Action Alternative

There would be no changes from the existing visual resources offered by South Tongue Point from Alternative C.

## **4.2 STATE-OWNED ISLANDS**

### **4.2.1 PHYSICAL ENVIRONMENT**

#### **4.2.1.1 Topography, Soils and Sediments**

##### **A. Submerged Lands and Wetlands**

No changes to submerged lands or wetlands would be expected under any of the three alternatives beyond existing conditions and present activities.

##### **B. Uplands**

None of the three alternatives is expected to result in changes to current activities. Should the Service gain ownership to the spoil islands (see Chapter 2.0), the Service would not seek to preclude using these islands for navigation channel maintenance spoil deposition. Under any of the alternatives, these islands would continue to change in topography as result of spoil placement and from the erosive forces of the Columbia River.

#### **4.2.1.2 Other Physical Features**

None of the alternatives is expected to result in changes to existing air quality, noise levels, or surface water quality.

### **4.2.2 BIOLOGICAL ENVIRONMENT**

#### **4.2.2.1 Wildlife Habitats**

##### **A. Spoil Island Grasslands**

##### **Alternatives A and B - Exchange of State-owned Islands**

Under both Alternatives A and B, the Service would accept the transfer of fee title ownership of the spoil islands from GSA. The Service does not expect to significantly change wildlife management practices from those presently existing under cooperative agreements. The Service would seek to continue a grassland management program for geese and maintain existing habitat for colonial nesting birds (Section 3.2.2.2 -- Fish and Wildlife).

In recent years there have been a number of proposals for increased commercial and recreational activity in the Columbia River Estuary. Examples are proposals for development of marinas or recreational marine parks on spoil islands, and dredge spoil disposal associated with navigation channel deepening. Such proposals pose the potential for harming wildlife habitat and disturbing wildlife within the Refuge.

It is expected that demands for the exploitation of estuary resources for commercial and recreational uses will increase substantially. Under the present cooperative agreement, the Service is limited in the extent to which it may control incompatible uses potentially harmful to wildlife on those habitats under State and County ownership. With the expiration of the present cooperative agreement in 2024, the Service would be unable to influence decisions on potentially incompatible uses. Conflicting demands on estuary resources may make initiating another cooperative agreement untenable.

Fee title ownership of the spoil islands would provide the Service with a more substantial and durable means of protecting wildlife resources, and would allow the Service to develop long range wildlife habitat management plans. Also, fee title ownership would allow the Service greater flexibility in changing management practices to more effectively address potential changes in biological conditions or management policy.

##### **Alternative C - No Action Alternative**

Service wildlife management practices on the spoil islands would continue under the existing cooperative agreements. Wildlife habitats could not be as effectively managed as under fee title



ownership. There are no guarantees that wildlife management would continue once existing cooperative agreements have expired.

#### **B. Tidal Marshes, Tidal Swamps, and Upland Forest**

None of the alternatives is expected to result in changes to these habitats other than through natural events. Service wildlife management practices would continue under the existing cooperative agreements.

#### **4.2.2.2 Fish and Wildlife**

##### **A. Fish and Wildlife Observed and Expected**

As discussed in Section 3.2.2.2 (Fish and Wildlife), goose nests and colonial nesting bird numbers have been increasing under Service management. These numbers would fluctuate with changes in the suitability and size of nesting habitat. Overall, wildlife use of habitats within the Refuge is not expected to change significantly with a land ownership exchange. However, Service ownership would provide the Service greater control over habitat management and would allow the Service to protect wildlife from potential threats to habitat.

##### **B. Threatened, Endangered, and Sensitive Species**

The Service is obligated to protect threatened and endangered species under the authority of the Endangered Species Act with or without a land ownership exchange. Should bald eagles establish a nesting territory on any of the islands, the Service would be obligated to protect the nest site. Service land ownership may allow the Service greater latitude than presently exists in attempting to enhance habitat for bald eagles.

#### **4.2.3 SOCIAL AND CULTURAL ENVIRONMENT**

##### **4.2.3.1 Land Use**

None of the alternatives would result in a Service change in land use. The protection of wetland habitats as a wintering area and migrational stop-over area would remain the primary focus of the Refuge (Section 3.2.3.1 -- Land Use).

##### **4.2.3.2 Public Use**

None of the alternatives is expected to result in a change from existing public use policies and activities (Section 3.2.3.2 -- Public Use).

#### **4.3 COMPARISON OF ALTERNATIVES**

Table 4-4 presents a comparative matrix of benefits and impacts for each of the three alternatives. The matrix summarizes information presented in the Chapter 4 sections discussed above for the physical, biological, cultural, social, and economic factors potentially influenced by the proposed action. Alternatives A and B all have some overall beneficial and detrimental effects. Alternative C is considered to have neutral effects.

Implementation of both Alternatives A and B would result in economic benefits, thereby meeting the project objectives (Chapter 1.0). Both Alternatives A and B would also result in some detrimental environmental effects, for the most part to biological factors; however, none of the adverse effects of Alternative A would be significant. Alternative B would result in greater impacts on biological factors than Alternative A, with significant impacts to wetlands and to bald eagles (in Phase 2). Alternative C would not have adverse or beneficial effects, and would not meet the project objectives.

#### **4.4 UNAVOIDABLE ADVERSE IMPACTS**

Unavoidable impacts are those that would have a significant adverse effect on the environment and for which there are no mitigation measures available to reduce the adverse effect to a level of less than significant. No unavoidable adverse impacts would result from Alternative A.

Unavoidable adverse impacts could result from Alternative B to (1) bald eagles, and (2) wetlands. Both of these impacts would be the result of the Phase 2 road connection to North Tongue Point.

Impacts to bald eagles could result from the disturbance created by the road to important foraging habitat. Placement of perch sites adjacent to the project site may provide partial mitigation.

Impacts to wetlands would result from the removal or fill of approximately 4 acres of mudflat and marsh. A Corps 404 permit would be required for construction of this road, and a mitigation plan would be developed at that time.

#### **4.5 MITIGATION MEASURES**

There would be some adverse effect resulting from the proposed project (Alternative A) on upland and aquatic topography, soils and geology, sediments, groundwater quality, wetlands, noise, plant communities, fish and wildlife (including salmonids), and visual resources. As discussed above, these impacts would not be significant and do not require mitigation. Although impacts to wetlands are not considered to be significant, mitigation is required for the Corps 404 Permit process. Therefore, wetland mitigation for the 0.57 acres of fill is addressed in Appendix C.

TABLE 4-4

## SUMMARY OF ADVERSE AND BENEFICIAL IMPACTS

| Factor                                              | Alternative A | Alternative B | Alternative C |
|-----------------------------------------------------|---------------|---------------|---------------|
| <b>SOUTH TONGUE POINT</b>                           |               |               |               |
| <b>Physical Environment</b>                         |               |               |               |
| Upland Topography                                   | -             | -             | O             |
| Aquatic Topography                                  | -             | -             | O             |
| Soils and Geology                                   | -             | -             | O             |
| Sediments                                           | -             | -             | O             |
| Water Quality                                       | -             | -             | O             |
| Groundwater                                         | O             | O             | O             |
| Water Courses and Floodplains                       | O             | -             | O             |
| Wetlands                                            | -             | --            | O             |
| Air Quality                                         | O             | O             | O             |
| Noise and Activity                                  | -             | -             | O             |
| Transportation                                      | +             | +             | O             |
| Storm Drainage                                      | O             | O             | O             |
| Sanitary Sewer                                      | +             | +             | O             |
| Domestic Water Supply                               | O             | O             | O             |
| Upland Hazardous Materials                          | O             | +             | O             |
| Sediment Hazardous Materials                        | O             | O             | O             |
| <b>Biological Environment</b>                       |               |               |               |
| Plant Communities                                   | -             | -             | O             |
| Threatened, Endangered, and Sensitive Plant Species | O             | O             | O             |
| Fish and Wildlife                                   | -             | -             | O             |
| Salmonids                                           | -             | -             | O             |
| Bald Eagles                                         | -             | --            | O             |
| <b>Cultural and Social Environment</b>              |               |               |               |
| Land Use                                            | +             | +             | O             |
| Population                                          | +             | +             | O             |
| Housing                                             | +             | +             | O             |
| Employment                                          | ++            | ++            | O             |
| Fiscal                                              | ++            | ++            | O             |
| Cultural and Archaeological                         | O             | -             | O             |
| Visual Resources                                    | -             | -             | O             |

**KEY:**

- O Neutral effect, with no adverse or significant impacts.
- Some adverse impact, but either not significant or can be mitigated to a level of less than significant.
- Significant adverse impact that cannot be mitigated to a level of less than significant.
- +
- ++ Significant beneficial impact.

TABLE 4-4, cont'd.

## SUMMARY OF ADVERSE AND BENEFICIAL IMPACTS

| Factor                                        | Alternative A | Alternative B | Alternative C |
|-----------------------------------------------|---------------|---------------|---------------|
| <b>STATE-OWNED ISLANDS</b>                    |               |               |               |
| <b>Physical Environment</b>                   |               |               |               |
| Submerged Lands and Wetlands                  | O             | O             | O             |
| Uplands                                       | O             | O             | O             |
| <b>Biological Environment</b>                 |               |               |               |
| Spoil Island Grasslands                       | +             | +             | O             |
| Tidal Marshes, Tidal Swamps, and Forest       | +             | +             | O             |
| Fish and Wildlife                             | +             | +             | O             |
| Threatened, Endangered, and Sensitive Species | +             | +             | O             |
| <b>Social and Cultural Environment</b>        |               |               |               |
| Land Use                                      | O             | O             | O             |
| Public Use                                    | O             | O             | O             |

**KEY:**

- O Neutral effect, with no adverse or significant impacts.
- Some adverse impact, but either not significant or can be mitigated to a level of less than significant.
- Significant adverse impact that cannot be mitigated to a level of less than significant.
- +
- ++ Significant beneficial impact.



Impacts with the potential to have significant adverse effects require mitigation measures to reduce or eliminate the level of the impact. The proposed project at South Tongue Point has the potential to generate significant adverse impacts to (1) surface water quality and (2) bald eagles.

Impacts to surface water quality from the proposed project (Alternative A) could be adversely affected by storm runoff and accidental spills of industrial chemicals. This impact would be avoided through the use of the mitigation measures described below. Impacts to surface water quality would be slightly greater from Alternative B than Alternative A because of the increased surface area provided by the access road to North Tongue Point. This impact could be mitigated to a level of less than significant through treatment of the road runoff with a similar process to that described below for Alternative A.

Impacts to bald eagles from the proposed project (Alternative A) have the potential to be significant and would require the incorporation of certain mitigation measures to reduce the level of impact to less than significant. The main adverse impact of Alternative A would be the potential interference with the ability of a resident pair of bald eagles to forage in the immediate vicinity of the project site because of the species' tendency to avoid human disturbance (Section 4.1.2.2.B -- Threatened, Endangered, and Sensitive Wildlife Species).

The following mitigation measures would reduce the severity of these impacts to a level of less than significant.

#### **4.5.1 MITIGATION MEASURES FOR IMPACTS TO SURFACE WATER QUALITY**

Impacts from stormwater runoff would be minimized by providing treatment for all stormwater discharges. Each tenant would have a stormwater management plan providing for biological stormwater treatment and outfall structure (with oil/water separators) specifically designed for the intended use of the parcel.

Pollutant removal efficiency goals for the project would be 65 percent for phosphorus, 65 percent for nitrogen, and 80 percent for biochemical oxygen demand (BOD). The biological stormwater runoff treatment facilities are moderately to highly efficient for the treatment of phosphorus, nitrogen, total suspended solids, and BOD. Heavy metals such as copper, chromium, nickel, lead, mercury, zinc, and iron along with several organic compounds, have also been shown to be removed to a high degree by these facilities.

The biological stormwater runoff treatment facilities would be located within the upland areas on the site. Design standards would be based on the volume of stormwater resulting from a 25-year storm in the Astoria area. Depending on the specific site design for each parcel, one or more of the following four structural features would be used for this purpose:

- Bioswales;
- Biofilter strips;

- Wet swales; or
- Small created wetland treatment ponds.

**Bioswales** are turf grass-vegetated channels with either parabolic or 3:1 horizontal to vertical side slopes, possessing longitudinal slopes in the range of 2 to 6 percent and lengths of 100 to 200 feet or more. Bioswales with greater widths would be used to compensate for swales less than 200 feet long to obtain equivalent water residence times.

**Biofilters**, vegetated rectangular areas which are not as deeply incised into the landscape as bioswales, may also be used where infiltration into the soil is desired. Grasses such as red fescue (*Festuca rubra*), meadow foxtail (*Alopecurus pratensis*), timothy (*Phleum pratense*), and reedtop (*Agrostis alba*) would be seeded into these swales.

Due to the relatively flat topography of the site, **wet swales** would be necessary in areas where the 2 to 6 percent slopes of bioswales cannot be incorporated into the design. Wet swales would be seeded or plugged with such species as slough sedge (*Carex obnupta*) and small-fruit bulrush (*Scirpus microcarpa*), which are tolerant of frequent inundation.

**Small created wetland treatment ponds** are designed for use where it is not possible to site a linear swale system, or where impervious surfaces generate larger volumes of water than can be effectively treated in wet swales or bioswales.

#### 4.5.2 MITIGATION MEASURES FOR IMPACTS TO BALD EAGLES

The main impact would be the loss of available perch sites and the reduction of available foraging area for resident and migrant eagles. Implementation of the following measures would reduce the level of the project impacts to less than significant.

##### 4.5.2.1 Compensation for Temporary Disturbances Caused By Construction Activities

- Design construction schedules to reduce or avoid disturbances during the main foraging periods, such as when low tides expose intertidal areas during the early morning hours.
- When possible, plan construction activities to avoid the breeding period (March to August). When construction activities cannot be avoided during the breeding period, plan for them to occur as late as possible in the period, when eagles have invested sufficient energy in nesting and fledging to lessen the likelihood that nest or young will be abandoned.

#### **4.5.2.2      Compensation for the Impacts of Project Design**

Include the following project design elements:

- Downward-directed lighting systems;
- Landscaping that screens development;
- Trails and access paths that minimize human presence in the site's natural areas; and
- Limitations to hours of operation to minimize noise and activity during the main foraging periods for the eagles.

#### **4.5.2.3      Compensation for the Disturbances Caused by Project Operation**

- Install perches at least four meters in height (Garrett et al., 1988) in areas where (a) resident and (b) migrant bald eagles frequently forage (Figure 3-12), as follows:
  - a. For the resident Mill Creek pair, erect pilings or dolphins in the intertidal areas of Taylor Sands areas and high pilings along the western edge of Mott and Lois Islands to provide perch sites where the eagles would not be disturbed by boat traffic but could still view favored foraging areas.
  - b. For migrant (wintering) eagles, erect pilings in the marshes east of Lois Island, on Russian Island, or Green Island to provide undisturbed perches for these preferred foraging areas.

#### **4.6      IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES**

Irreversible and irretreivable commitments of resources associated with the proposed project (Alternatives A and B) are:

1. The permanent conversion of 0.57 acres of wetlands for Alternative A and approximately 4.57 for Alternative B;
2. The permanent conversion of 50 acres of wildlife habitat;
3. Potentially, a reduction in available eagle foraging habitat if the eagles fail to habituate to the disturbance posed by the project; and
4. The energy and resources that would be expended to construct and operate the project.

#### **4.7 SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY**

The proposed development plan for South Tongue Point (Alternatives A and B) has been designed to minimize impacts to the natural environment. Development activities in the northern and southern ends of South Tongue Point have avoided areas known to be environmentally sensitive. Wetland impacts are limited to approximately 0.57 acres of fill for Alternative A and 4.57 acres for Alternative B.

Since the multi-tenant marine industrial development at South Tongue Point is considered to be a long-term use of the site, the only short-term uses are construction activities. As discussed above, construction activity may be disruptive to fish and wildlife in the area, although these impacts are not considered to be significant.

Long-term productivity of the upland area at South Tongue Point, as wildlife habitat, would be reduced at full build-out, since the site would be characterized by industrial buildings and activities. Some existing natural areas would be preserved (particularly at the northern and southern ends of the site). The natural areas would be supplemented with landscaping. Therefore, some birds and small mammals may continue to use South Tongue Point for habitat. Long-term productivity of the tidal marsh wetlands would be preserved, since the development would largely be within existing uplands and dredging would not be required to initiate the project. As noted above, new piers would be pile-supported. Maintenance dredging of the access channel in Phase 2, if it proves to be needed, could reduce the long-term productivity of small portions of the aquatic habitat directly adjacent to South Tongue Point.

The long-term productivity of the area to be filled for the new road connection between South Tongue Point and North Tongue Point would be more seriously compromised, but not eliminated.

#### **4.8 CUMULATIVE IMPACTS**

Cumulative impacts are those effects of the project that may contribute to larger, regional, or ongoing impacts. Cumulative impacts are difficult to quantify, but are important to consider since their additive quality can allow them to continue undetected and unmitigated until a serious problem develops.

The South Tongue Point project may contribute to cumulative impacts on: (1) housing and infrastructure, and (2) the biological environment.

##### **4.8.1 CUMULATIVE IMPACTS ON HOUSING AND INFRASTRUCTURE**

The proposed project would result in a permanent housing demand ranging from approximately 91 units in project year two to 555 units at project lease-out. If the population of the project area increases due to an improved economic climate, the South Tongue Point project could



contribute to a regional housing shortage. Given the limited availability of developable land in Astoria, new residential development may be expected to occur in other areas of Clatsop County, potentially increasing infrastructure demands in those areas.

However, it should be recognized that the City of Astoria has lost population from its peak, and an underutilized infrastructure exists within the City boundaries. A portion of the required housing could, therefore, be accomplished through redevelopment, with a resulting positive impact to the City of Astoria.

#### **4.8.2 CUMULATIVE IMPACTS ON THE BIOLOGICAL ENVIRONMENT**

South Tongue Point has the potential for providing upland storage area for North Tongue Point, which may allow North Tongue Point to develop more intensively. This could increase boat traffic and other activity in the area. The impacts of a more intensively developed North Tongue Point could contribute to a cumulative decline in water quality through an incremental contribution to pollution, adding to regional impacts which could be carried through all levels of the ecosystem.

A more intensively developed North Tongue Point could also result in an increase in human disturbances over the present levels. Taken cumulatively with the expected impacts of the proposed project, this increased level of human activity on three sides of the Mill Creek embayment would likely reduce the foraging efficiency of the Mill Creek bald eagle pair and of wintering eagles presently using the embayment.

## **CHAPTER 5.0**

### **COMPLIANCE, CONSULTATION, AND COORDINATION**

#### **5.1 ENVIRONMENTAL REVIEW AND CONSULTATION**

This Draft EIS has been prepared concurrently with environmental review and consultation required by Federal environmental law. Following are the principal authorities under which this action is conducted, including those acts which require review and consultation.

##### **5.1.1 FEDERAL LEGISLATIVE ACTS**

###### **5.1.1.1 The Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.)**

Section 7 of the Endangered Species Act of 1973 requires Federal agencies to ensure that their actions do not jeopardize the continued existence of threatened or endangered species, or result in the destruction or adversely modify critical habitat of these species. Because the Service is the lead agency on this Draft EIS, an internal formal Section 7 consultation is being conducted concerning bald eagles. The Service has also initiated a Section 7 consultation with the National Marine Fisheries Service concerning the Snake River sockeye salmon.

###### **5.1.1.2 Comprehensive Environmental Responses, Compensation, and Liability Act (42 U.S.C. 9620)**

This law, as amended, states that Federal facilities are subject to the same cleanup requirements and liability as nongovernment entities. The Corps has cleaned the contaminated sites at South Tongue Point.

###### **5.1.1.3 Uniform Relocation Assistance and Real Property Acquisition Policy Act of 1970 (42 U.S.C. 4601, 4602, 4621-4638, 4651-4655, P.L.91-646, 84 Stat. 1894)**

This Act established uniform land acquisition policies for all Federal agencies. The land exchange will be conducted within the policy and guidance established by this Act.

###### **5.1.1.4 Coastal Zone Management Act of 1972 (16 U.S.C Sec 1451 et seq.)**

Section 307 of this Act directs Federal actions, to the extent practicable, to be consistent with approved State coastal management programs. The Service and cooperating agencies will be seeking a consistency determination from the Oregon Department of Land Conservation and Development.

**5.1.1.5      National Wildlife Refuge System Administration Act of 1966, as amended (16 U.S.C. 6688dd-668ee)**

This Act provides policy and guidance for the administration of all lands and waters of the National Wildlife Refuge Administration System. The Act provides management directives for fish and wildlife, including those that are threatened with extinction, on lands acquired for inclusion into the Refuge System. The provision of sanctions and enforcement actions to protect the resources of the Refuge System are also incorporated into this Act.

**5.1.2   EXECUTIVE ORDERS**

**5.1.2.1      Protection of Wetlands -- Executive Order 11990**

This Executive Order requires Federal agencies to avoid actions adversely affecting wetlands unless there is no practicable alternative available and the proposed action includes all practicable measures to minimize harm to wetlands. Alternative A (the Service's Preferred Alternative) minimizes adverse impacts to wetland resources.

**5.1.2.2      Flood Plain Management -- Executive Order 11988**

This Executive Order requires Federal agencies to avoid adverse effects and incompatible development in flood plains. The agency must minimize potential harm to, or within the flood plain. Alternative A (the Service's Preferred Alternative) minimizes harm to natural resources associated with the flood plains within the project area.

**5.1.2.3      Protection of Historical, Archaeological, and Scientific Properties -- Executive Order 11593**

This Executive Order requires Federal agencies to preserve and protect historical, archaeological and scientific properties to the extent practicable. An archaeological records search indicates that Alternative A (the Service's Preferred Alternative) will not affect any historical, archaeological, or scientific properties.

**5.1.3   COORDINATION WITH FEDERAL, STATE, AND LOCAL AGENCIES**

**5.1.3.1      Coordination with Federal Agencies**

This Draft EIS is a cooperative effort by the Service, Corps, GSA, and Division. The Service's Portland Ecological Services Field Office participated in the preparation of this document. The agencies represented on the Draft EIS team have coordinated with all appropriate Federal agencies which might have an interest in the project.

#### **5.1.3.2      Coordination with State and Local Agencies**

The agencies represented on the Draft EIS team have coordinated with appropriate State agencies such as Oregon Department of Fish and Wildlife, Oregon Department of Land Conservation and Development, Oregon Economic Development Department, Oregon Department of Transportation, and Oregon Department of Water Resources.

#### **5.1.4    CONFORMANCE WITH LOCAL COMPREHENSIVE PLANS AND STATEWIDE PLANNING GOALS**

The Oregon Land Use Act (Senate Bill 100) established Oregon's land use planning system on October 5, 1973. The land use planning system includes a framework of 19 Statewide Planning Goals. The goals are implemented primarily through local comprehensive plans. Local governments may take "exceptions" to Statewide Planning Goals in accordance with Goal 2 (Land Use Planning). Goal exceptions are taken by the local government through the comprehensive plan amendment process.

The City of Astoria recently amended the Comprehensive Plan to allow a mixture of water-dependent and non-water-dependent uses at South Tongue Point. At the same time, exceptions to Statewide Planning Goal 16 (Estuarine Resources) were taken to allow:

1.     Pile-supported structures in the intertidal wetland area;
2.     Wetland fills associated with the marine industrial development; and
3.     Road connection to North Tongue Point.

The range of tenants that would be expected to occupy South Tongue Point are permitted outright or conditionally by the existing comprehensive plan designations. Therefore, Alternative A, as well as Alternative B, have been reviewed by the City and determined to be consistent with the Comprehensive Plan.

##### **5.1.4.1      Statewide Planning Goals**

###### **A.     Goal 1: Citizen Involvement**

As described in the Scoping Report (Appendix A), there has been extensive public involvement efforts throughout the master planning process and during the preparation of the Draft EIS. Meetings have been conducted with local, State, and Federal agencies, in addition to meetings which have been open to the public. Furthermore, a public hearing will be held to receive oral and written comments on the Draft EIS in addition to a 60-day public comment period. Therefore, citizen involvement has been incorporated into this process and meets the intent of Goal 1.



## **B. Goal 2: Land Use Planning**

As discussed above, Alternative A and Alternative B are consistent with the Astoria Comprehensive Plan (Section 3.1.3.1.B -- Comprehensive Plan and Zoning Designations). According to the Transportation Planning Rule (see Goal 12, below), the new access road to the site would not require exceptions to Goal 3 (Agricultural Lands), Goal 4 (Forest Lands), Goal 11 (Public Facilities), or Goal 14 (Urbanization). Therefore, Alternative A and Alternative B are consistent with Goal 2.

## **C. Goal 3: Agricultural Land**

The marine industrial development would be within the Astoria Urban Growth Boundary in an area designated for industrial development. The area that would be affected by right-of-way acquisition for the new access road from U.S. Highway 30 is designated for rural residential uses. Neither South Tongue Point, nor the adjacent rural residential area are used or planned for agricultural purposes. Therefore, there is no conflict with Goal 3.

## **D. Goal 4: Forest Land**

The marine industrial development would be within the Astoria Urban Growth Boundary in an area designated for industrial development. The area that would be affected by right-of-way acquisition for the new access road from U.S. Highway 30 is designated for rural residential uses. Neither South Tongue Point, nor the adjacent rural residential area are used or planned for forest purposes. Therefore, there is no conflict with Goal 4.

## **E. Goal 5: Open Spaces, Scenic and Historic Areas, and Natural Resources**

South Tongue Point is designated for industrial development. It does not include cultural areas, historic areas, open space, scenic areas, or wilderness areas. Although this environment is highly altered by human activity it is within the home range of resident bald eagles. The impacts to bald eagles and measures to mitigate these impacts have been addressed (Section 4.1.2.2.B -- Threatened, Endangered, and Sensitive Wildlife). Impacts to wetlands have also been minimized (Section 4.1.1.3.D -- Wetlands).

The area near the mouth of Mill Creek has been identified as potentially archaeologically sensitive. If Alternative B is selected, further investigation would be required to determine whether resources are present in this area.

## **F. Goal 6: Air, Water and Land Resources Quality**

As discussed above (Section 4.1.1.4 -- Air Quality), impacts to air quality are not anticipated. Impacts to water resources would be minimized through the implementation of biological stormwater treatment systems and other water quality standards that would apply to tenants at

South Tongue Point (Section 4.1.1.3.A -- Surface Water Quality). The large majority of the site to be developed is designated for industrial use. Wetland fills have been limited as much as possible. Therefore, the quality of air, water, and land resources would be maintained.

**G. Goal 7: Areas Subject to Natural Disasters and Hazards**

The portion of South Tongue Point to be occupied by structures, outdoor storage and activity areas, and roads will be raised above the 100-year flood elevation. There are no other known natural disaster or hazard issues at South Tongue Point. Therefore, there is no conflict with Goal 7.

**H. Goal 8: Recreational Needs**

The proposed project does not affect existing or proposed recreational facilities or destination resorts. Therefore, there is no conflict with Goal 8.

**I. Goal 9: Economic Development**

The proposed project would provide substantial economic development opportunities to a locally depressed economy (Section 4.1.3.2 -- Socioeconomic). Approximately 610 jobs (direct, indirect, and induced) would be created by project build-out. The project is expected to increase property taxes in Clatsop County by about \$1.1 million, with the bulk of the revenues expected to accrue to the City of Astoria and the local school districts. There would be no displacement of existing businesses with the proposed project. Therefore, economic development opportunities are provided, consistent with Goal 9.

**J. Goal 10: Housing**

There would be no displacement of existing residences with the proposed project. Right-of-way acquisition for the new access road would result in the alteration of one residential driveway. The project would create additional demand for housing in Clatsop County and the Portland area (Section 4.1.3.2.B -- Housing). Proposals to build new housing in response to the projected demand would be reviewed through local land use decision-making processes, and would be expected to be consistent with Goal 10.

**K. Goal 11: Public Facilities and Services**

Water and sewer systems would be extended to South Tongue Point to serve future development. These extensions are appropriate since the site is within the Astoria Urban Growth Boundary and designated for urban uses. The water extension would provide a looped system for the City, thereby increasing water pressure and fire-fighting capabilities within the City.

The Division is currently in the process of annexing South Tongue Point to the City of Astoria. According to the Comprehensive Plan, annexation is required prior to extending sewer service. Therefore, there is no conflict with Goal 11.

**L. Goal 12: Transportation**

The proposed project includes the construction of a new road into South Tongue Point from U.S. Highway 30 and closure of the existing causeway (although emergency access would be allowed). The new access road would provide an improved entrance to the site which is capable of safely accommodating industrial truck traffic (Section 4.1.1.6 -- Public Facilities).

According to the Transportation Planning Rule recently adopted by the Land Conservation and Development Commission (OAR 660-12), the new road is an *access road* because it would be a low volume road and provide access to travel within a built and committed exception area. As noted above, agricultural and forest land are not affected by the project. Therefore, provisions for exceptions to Goals 3 and 4 are not applicable.

The Transportation Planning Rule states that *access roads* in built and committed exception areas are consistent with Goals 11 and 14. Therefore, exceptions to Goals 11 and 14 are not required.

**M. Goal 13: Energy Conservation**

There would be increased energy consumption due to construction of roads, utilities, and buildings at South Tongue Point. Energy would also be expended during the operation of future industrial uses. Energy conservation measures required by State and local regulations would apply to all construction and operation activities. Therefore, there is no conflict with Goal 13.

**N. Goal 14: Urbanization**

The proposed project would provide for the urbanization of lands designated for urban use. The new access road would provide a connection from South Tongue Point to U.S. Highway 30, crossing a rural exception area. According to the Transportation Planning Rule (see Goal 12), an exception to Goal 14 is not required. Therefore, there is no conflict with Goal 14.

**O. Goal 15: Willamette River Greenway**

The natural resources protected by Goal 15 are not affected by the proposed project. The project is not in the vicinity of the Willamette River. Therefore, Goal 15 does not apply to the proposed project.

**P. Goal 16: Estuarine Resources**

As discussed above, exceptions to Goal 16 have been taken to allow Alternative A as well as Alternative B. These exceptions have been incorporated into Astoria's Comprehensive Plan. Therefore, Alternatives A and B do not conflict with Goal 16.

**Q. Goal 17: Coastal Shorelands**

According to Goal 17, South Tongue Point is a coastal shoreland because it is adjacent to an estuary and includes wetland biological habitats. Goal 17 states that coastal shorelands in urban areas shall be protected for water-dependent recreational, commercial, and industrial uses. Impacts to Goal 17 resources are not considered to be significant as described in Surface Water Quality (Section 4.1.1.3.A), Wetlands (Section 4.1.1.3.D), Vegetation (Section 4.1.2.1.A), Fish and Wildlife (Section 4.1.2.2), Cultural and Archaeological (Section 4.1.3.3), and Visual Resources (Section 4.1.3.4). Therefore, there is no conflict with Goal 17.

**R. Goal 18: Beaches and Dunes; Goal 19: Ocean Resources**

The natural resources protected by Goal 18 and 19 are not affected by the proposed project. The project is not in the vicinity these coastal resources. Therefore, Goals 18 and 19 do not apply to the proposed project.

**S. Conclusion**

The proposed project would be consistent with an acknowledged comprehensive plan. The acknowledgement process certifies that the comprehensive plan is consistent with the Statewide Planning Goals. The 19 Statewide Planning Goals have been addressed above to further demonstrate the proposed project's consistency with the goals. Since the project would be consistent with the Astoria Comprehensive Plan and relevant Statewide Planning Goals, no additional goal exceptions or plan amendments would be required to implement Alternative A or Alternative B.

**5.2 PUBLIC INVOLVEMENT**

From April 1990 to January 1992, five public meetings, seven formal hearings and numerous informational meetings have been conducted by the Division in an effort to identify issues and concerns associated with the proposed project.

On November 4, 1991 the Notice of Intent to prepare a Draft EIS was published in the Federal Register. The Notice of Intent indicated that the scoping period would be open until November 29, 1991.



Also, a Service issued Public Notice announcing the Draft EIS effort, associated scoping activities, and comment period was provided to Portland and Astoria area newspapers; Federal, State, and local agencies; and numerous citizens and private organizations.

During the scoping period the Service received six letters.

In April 1992, Information Sheet #1 was prepared and distributed to interested parties. Also in April, the Service made the EIS Scoping Report available. Both of these documents were provided to individuals requesting more information.

### **5.3 DRAFT EIS DISTRIBUTION**

This Draft EIS was distributed to the agencies, organizations, and individuals listed below.

#### **5.3.1 FEDERAL AND STATE CONGRESSIONAL DELEGATIONS**

- Office of State Senator Joan Dukes
- Office of State Representative Jakie Taylor
- Office of U.S. Congressman Les AuCoin
- Office of U.S. Senator Mark O. Hatfield
- Office of U.S. Senator Bob Packwood

#### **5.3.2 FEDERAL AGENCIES**

- Department of Defense
  - U.S. Army Corps of Engineers
- Department of Interior
  - U.S. Fish and Wildlife Service
- Environmental Protection Agency
- U.S. General Services Administration

#### **5.3.3 STATE AND LOCAL AGENCIES**

- City of Astoria
- Clatsop County Board of Commissioners
- Clatsop County Planning
- Clatsop-Tillamook Intergovernmental Council
- Columbia River Estuary Study Taskforce
- Office of the Governor
- State of Oregon
  - Department of Environmental Quality
  - Department of Fish and Wildlife
  - Department of Geology & Mineral Industries

- Department of Land Conservation and Development
- Department of Transportation
- Department of Water Resources
- Division of State Lands
- Economic Development Department
- Fish and Wildlife Commission
- Historic Preservation Office
- Marine Board

#### 5.3.4 PUBLIC LIBRARIES

- Astoria Public Library
- Oregon State University Library
- University of Oregon Library

#### 5.3.5 PRIVATE INDIVIDUALS AND GROUPS

- Kathleen Confer
- Joe Di Bartolomeo
- Howard Bruner
- The Daily Astorian
- The Daily News, Longview, Washington
- David Evans and Associates, Inc.
- Monte Garrett
- Michelle Girtz
- Scott Greacen
- The Humane Society of the United States
- Lynne Krasnow
- Mark Liverman
- Neal Maine
- Grant McOmie
- Northwest Environmental Advocates
- Oregon Cooperative Research Unit
- Oregon Eagle Foundation
- Oregon Natural Heritage Program
- The Oregonian
- Pacific Northwest Natural Resources Center
- Diana Popp
- Gregory L. Schroer
- Larry Tuttle
- Sara Vickerman
- Wendall Wood

## CHAPTER 6.0 LIST OF PREPARERS

### 6.1 U.S. FISH AND WILDLIFE SERVICE

| PREPARER                            | ROLE                                                             | QUALIFICATIONS & EXPERIENCE                                                                                                                                     |
|-------------------------------------|------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Alan C. Clark<br>Wildlife Biologist | Assistant Author: Affected<br>Environment State-Owned<br>Islands | Ph.D., Animal Nutrition; Wildlife<br>Biologist, Julia Butler Hansen Refuge for<br>the Columbian White-tailed Deer; U.S.<br>Fish and Wildlife Service, 15 years. |
| Ben Harrison<br>Wildlife Biologist  | EIS Team Leader                                                  | M.S., Plant and Soil Science; Wildlife<br>Biologist, Division of Refuges and<br>Wildlife, Region 1; U.S. Fish and Wildlife<br>Service, 9 years.                 |
| James A. Hidy<br>Project Leader     | Assistant Author: Affected<br>Environment State-Owned<br>Islands | M.F., Forestry; Wildlife Management,<br>Willapa National Wildlife Refuge<br>Complex; U.S. Fish and Wildlife Service,<br>11 years.                               |
| Judee Jacoby<br>Realty Specialist   | EIS Team Member                                                  | Senior Right-of-Way Agent; Division of<br>Refuges and Wildlife, Region 1; U.S. Fish<br>and Wildlife Service, 13 years.                                          |
| Laura Todd<br>Wildlife Biologist    | EIS Team Member                                                  | B.S. Biology; U.S. Fish and Wildlife<br>Service, 2 years.                                                                                                       |

### 6.2 U.S. ARMY CORPS OF ENGINEERS

|                                                                          |                 |                                                              |
|--------------------------------------------------------------------------|-----------------|--------------------------------------------------------------|
| Richard K. Johnson<br>Team Leader<br>Permit Evaluation Regulatory Branch | EIS Team Member | B.S., Civil Engineering; Regulatory<br>experience, 10 years. |
|--------------------------------------------------------------------------|-----------------|--------------------------------------------------------------|

### 6.3 U.S. GENERAL SERVICES ADMINISTRATION

|               |                 |                   |
|---------------|-----------------|-------------------|
| Clara Bridges | EIS Team Member | Realty Specialist |
|---------------|-----------------|-------------------|

## 6.4 OREGON DIVISION OF STATE LANDS

| PREPARER                             | ROLE            | QUALIFICATIONS & EXPERIENCE                                                                                                   |
|--------------------------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------|
| E. David Blum<br>Project Coordinator | EIS Team Member | M.U.P., Urban Planning; Land use planning and real estate development consultant, 15 years; Division of State Lands, 2 years. |

## 6.5 DAVID EVANS AND ASSOCIATES, INC.

|                                                            |                                                                    |                                                                                                                                                                                          |
|------------------------------------------------------------|--------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Lawrence L. Devroy<br>Natural Resources Manager            | Biological Factors, Wetland and Shading Impacts                    | M.S., Marine Biology; Natural Resource Manager/Environmental Consultant, 7 years; Environmental Specialist, Florida Department of Environmental Regulation and Pinellas County, 4 years. |
| Gregg S. Everhart<br>Landscape Designer                    | Graphics, Master Plan Development                                  | M.L.A., Landscape Architecture; Landscape designer, David Evans and Associates, Inc., 3 years.                                                                                           |
| Lisa Berzok Hanf<br>Planner                                | Project Manager, Alternatives, Land Use, Cultural Resources        | M.C.P., City Planning; Land use and environmental planning consultant, 8 years.                                                                                                          |
| Richard T. Leonard, AIA, AICP<br>Architect/Planner         | Master Plan and Alternatives Development                           | M.C.P., Planning Consultant and Registered Architect, 27 years.                                                                                                                          |
| J. Rodney Merrick, AIA<br>Architect                        | Master Plan Architect                                              | M.A., Architecture; Architect, 17 years.                                                                                                                                                 |
| Karen Swirsky<br>Ecologist/Planner                         | Principal Author; Affected Environment, Environmental Consequences | M.S., Biology; Environmental planning, consultant, 7 years; National Park Service, 2 years.                                                                                              |
| Kenneth M. Vigil, P.E.<br>Civil and Environmental Engineer | Water Quality Impacts                                              | M.S., Environmental Engineering; Senior Environmental Engineer, Oregon Department of Environmental Quality and David Evans and Associates, Inc., 5 years.                                |
| Elliot J. Zais<br>Senior Environmental Engineer            | Hazardous Materials                                                | Ph.D., Petroleum Engineering; Geothermal consultant, 6 years; Oil and gas consultant, 5 years; Environmental Engineer, 4 years.                                                          |



## 6.6 CLEARWATER BIOSTUDIES, INC.

| PREPARER                                | ROLE            | QUALIFICATIONS & EXPERIENCE                   |
|-----------------------------------------|-----------------|-----------------------------------------------|
| Charles Huntington<br>Aquatic Biologist | Aquatic Biology | B.S., Fisheries; Aquatic Biologist, 12 years. |

## 6.7 HAMILTON, RABINOVITZ & ALSCHULER, INC.

|                                                |                       |                                                                                                                                                                                          |
|------------------------------------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Robert H. Sims<br>Director of Economic Studies | Socioeconomic impacts | Ph.D., Public Policy Analysis Economic, Hamilton, Rabinovitz & Alschuler, 5 years; Economist, Merrill Lynch Valuation Services, 4 years; Assistant Economist, RAND Corporation, 4 years. |
|------------------------------------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 6.8 OGDEN BEEMAN & ASSOCIATES, INC.

|                                  |                                                   |                                                                                                                                                                                                              |
|----------------------------------|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ogden Beeman<br>President        | Open Channel<br>Hydraulics/Dredging<br>Quantities | Diploma, Hydraulic Engineering; Chief, Waterways Maintenance Branch, U.S. Army Corps of Engineers, Portland Branch; Marine Director, Port of Portland; President, Ogden Beeman & Associates, Inc., 16 years. |
| Joseph C. Howe<br>Staff Engineer | Water Quality - Existing<br>Conditions            | B.S., Civil Engineering; Waterway Engineering, Ogden Beeman & Associates, Inc., 3 years.                                                                                                                     |

## 6.9 R & W ENGINEERING, INC.

|                       |       |                                                                                   |
|-----------------------|-------|-----------------------------------------------------------------------------------|
| Harry C. Reeder, P.E. | Noise | B.S., Mechanical Engineering; Acoustical Specialist, R & W Engineering, 14 years. |
|-----------------------|-------|-----------------------------------------------------------------------------------|

## 6.10 TETRA TECH

|                                 |                                        |                                                       |
|---------------------------------|----------------------------------------|-------------------------------------------------------|
| Steve Ellis<br>Senior Scientist | Water Quality - Existing<br>Conditions | Ph.D., Biological Oceanography; Tetra Tech, 11 years. |
|---------------------------------|----------------------------------------|-------------------------------------------------------|

## CHAPTER 7.0

### REFERENCES CITED

- Barnes, M. Director, Columbia River Estuary Study Taskforce. Personal Communication. Telephone Interview: August 16, 1991.
- Barnes, M. 1991a (December 19). Letter. Barnes (Director, Columbia River Estuary Study Taskforce) to K. Swirsky of David Evans and Associates, Inc.
- Bartkus, V. Realty Specialist, U.S. Army Corps of Engineers. Personal Communication. Telephone Interview: January 24, 1992.
- Batelle Northwest Marine Sciences Laboratory. 1988. Confirmatory Chemical Analysis and Solid Plane Bioassays on Sediment from the Columbia River Estuary at Tongue Point, Oregon. Prepared for the U.S. Army Corps of Engineers, Portland District.
- Beak Consultants, Inc. 1981. Environmental Assessment Report: Tongue Point Coal Terminal, Oregon. Prepared for Swan Wooster Engineering.
- Bonneville Power Administration. 1991 (June). Draft County Employment, Population, and Households Projections. Idaho, Oregon, Washington, Appendix. Economic Forecasting Section.
- Bottom, D.L., K.K. Jones and M.J. Herring. 1984. Fishes of the Columbia River Estuary, Columbia River Estuary Data Development Program. Columbia River Estuary Study Taskforce, Astoria, Oregon.
- Bottorff, J., J. Schafer, D. Swanson, A. Elston and D. Anderson. 1987 (September). Noise Disturbance Study on Bald Eagles at Orcas and Shaw Island Ferry Terminals, San Juan County, Washington. Prepared for the Washington State Department of Transportation, Environmental Unit, Olympia, Washington.
- Bruner, H. Eagle Biologist. Personal Communication. Telephone Interview: August 16, 1991.
- Bruner, H. and F.B. Isaacs. 1990. Supplemental Feeding and Monitoring of Bald Eagles at Cathlamet Bay, Oregon. Oregon Eagle Foundation, Inc. Final Report to the Oregon Division of State Lands.
- Cates, B.C. 1983 (February). Fish Sampling Operations at South Tongue Point, Oregon. Special Report. U.S. Fish And Wildlife Service, Fisheries Assistance Office, Vancouver, Washington.

Christensen, B. Manager, Astoria Field Station, U.S. Army Corps of Engineers. Personal Communication. Telephone interviews: November 18 and 20, 1991.

Clatsop Community Action, Inc. 1991 (Winter). Annual Poverty Profile.

Columbia River Estuary Study Taskforce. 1979 (June). Columbia River Estuary Regional Management Plan.

Columbia River Estuary Study Taskforce. 1979. Columbia River Estuary Inventory of Physical, Biological, and Cultural Characteristics.

Columbia River Estuary Study Taskforce. 1981 (November). An Economic Evaluation of the Columbia River Estuary. Prepared by the Clatsop Tillamook Intergovernmental Council.

Columbia River Estuary Study Taskforce. 1981a (June). "Mediation Panel Agreement: Regarding Certain Proposed Water-Dependent Development Sites within the CREST Plan of June, 1979."

Columbia River Estuary Study Taskforce. 1981b (November). An Economic Evaluation of the Columbia River Estuary. Prepared by the Clatsop Tillamook Intergovernmental Council (R. Bartl and M. Morgan), with assistance from the Oregon Department of Economic Development (J. Robinette).

Columbia River Estuary Study Taskforce. 1991. Draft Update of 1981 Economic Evaluation of the Columbia River Estuary.

Corbyn, R.C. 1989 (March). The North West Company Fort at Tongue Point Oregon. Interagency Archaeological Services, Western Region, National Park Service, San Francisco, California.

Corps. See U.S. Army Corps of Engineers.

CREST. See Columbia River Estuary Study Taskforce.

David Evans and Associates, Inc. 1991a (March). Documentation of South Tongue Point Formation. Prepared for the Oregon Division of State Lands.

David Evans and Associates, Inc. 1991b (July). Biological Assessment for South Tongue Point, Astoria, Oregon: U.S. Navy Site Geotechnical Study. Prepared for the Oregon Division of State Lands.

David Evans and Associates, Inc. 1991c (December). Eagle Monitoring Report at South Tongue Point, Astoria, Oregon. Prepared for the Oregon Division of State Lands.

- David Evans and Associates, Inc. 1991d (February). Site Analysis -- Transportation Facilities. Memorandum to the File. File Number DSLN0001.
- David Evans and Associates, Inc. 1992. Hydrographic Chart: South Tongue Point Access Channel Navigation Aids, Option 2: Alternative Concept. Prepared for the Oregon Division of State Lands.
- Dawley, E.M., R.D. Ledgerwood, T.H. Blahm and A.L. Jensen. 1982. Migrational Characteristics of Chinook and Coho Salmon and Steelhead Trout in the Columbia River Estuary. Coastal Zone and Estuarine Studies. National Marine Fisheries Service, Northwest and Alaska Fisheries Center, Seattle, Washington.
- Dawley, E.M., R.D. Ledgerwood, T.H. Blahm, C.W. Sims, J.T. Durkin, R.A. Kim, A.E. Rankis, G.E. Monan and F.J. Ossiander. 1986. Migrational Characteristics, Biological Observations, and Related Survival of Juvenile Salmonids Entering the Columbia River Estuary, 1966-1983. Report to the Bonneville Power Administration (Contract No. DE-A179-84BP39652). National Marine Fisheries Service, Seattle, Washington.
- Dorsey, G. Biologist, U.S. Army Corps of Engineers. Personal Communication. Telephone Interview: May 25, 1992.
- Dorsey, G. Biologist, U.S. Army Corps of Engineers. Personal Communication. Telephone Interview: June 11, 1992.
- Durkin, J.T. and R.L. Emmett. 1980. Benthic Invertebrates, Water Quality, and Substrate Texture in Baker Bay, Youngs Bay, and Adjacent Areas of the Columbia River Estuary. Coastal Zone and Estuarine Studies. Final report of research financed by U.S. Fish and Wildlife Service Ecological Services Division, Portland, Oregon; National Oceanic and Atmospheric Administration; and the National Marine Fisheries Service, Northwest and Alaska Fisheries Center, Coastal Zone and Estuarine Studies Division, Seattle, Washington.
- Eastman, D.C. 1990. Rare and Endangered Plants of Oregon. Beautiful America Publishing Company, Oregon.
- Ellis, S. Senior Scientist, Tetra Tech, Inc. Personal Communication. Facsimile Communication: January 7, 1992.
- Emmett, R.L. Fisheries Biologist, U.S. National Marine Fisheries Service, Warrenton, Oregon. Personal Communication. Telephone Interview: February 19, 1992.
- Emmett, R.L., et al. 1984. Fish Sampling in Cathlamet Bay, Oregon. National Marine Fisheries Service, Seattle, Washington.



- Emmett, R.L., G.T. McCabe, Jr., T.C. Coley, R.J. McConnell and W.D. Muir. 1986. Benthic Sampling in Cathlamet Bay, Oregon -- 1984. Coastal Zone and Estuarine Studies. U.S. National Marine Fisheries Service and the National Oceanographic and Atmospheric Administration, Seattle, Washington.
- Emmett, R. L. Fisheries Biologist, National Marine Fisheries Service, Warrenton, Oregon. Personal Communication. Telephone Interview with C. Huntington (Clearwater BioStudies, Inc.): October 15, 1991.
- Emmett, R.L., S.A. Hinton, S.L. Stone and M.E. Monaco. 1991. Distribution and Abundance of Fishes and Invertebrates in West Coast Estuaries. Volume II: Species Life History Summaries. ELMR Report No. 8, National Oceanographic and Atmospheric Administration Strategic Environmental Assessments Division, Rockville, Maryland.
- Emmett, R.L. 1992. Fisheries Biologist, National Marine Fisheries Service, Warrenton, Oregon. Personal Communication. Telephone Interview with C. Huntington (Clearwater BioStudies, Inc.): January 2, 1992.
- Enviro Science, Inc. 1983. Environmental Assessment for 15-Acre Fill and Dredging at Tongue Point, Oregon. Prepared for Oregon Division of State Lands, Portland, Oregon.
- Envirosphere Company. 1980. Columbia River Estuary Data Development Program, Task B 3.1-2. Characterization of Water Quality. Volume II Appendices. Prepared for the Pacific Northwest River Basins Commission, Vancouver, Washington.
- Federal Interagency Committee for Wetland Delineation. 1989. Federal Manual for Identifying and Delineating Jurisdictional Wetlands. Cooperative Technical Publication of the U.S. Army Corps of Engineers; U.S. Environmental Protection Agency; U.S. Fish and Wildlife Service; and U.S. Department of Agriculture, Soil Conservation Service, Washington, D.C.
- Fox, D., S. Bell, W. Nehlson and J. Damron. 1984. The Columbia River Estuary: Atlas of Physical and Biological Characteristics. Columbia River Estuary Data Development Program. Columbia River Estuary Study Taskforce, Astoria, Oregon.
- Frey, B., R. Lara-Lara and L. Small. 1984. Water Column Primary Production in the Columbia River Estuary. Columbia River Estuary Data Development Program. Columbia River Estuary Study Taskforce, Astoria, Oregon.

- Fuhrer, G.J. and F.A. Rinella. 1983. Analyses of Elutriates. Native Water, and Bottom Material in Selected Rivers and Estuaries in Western Oregon and Washington. U.S. Geological Survey Open File Report 82-922. Prepared in cooperation with the U.S. Army Corp of Engineers, Portland, Oregon.
- Garrett, M., Anthony, R.G., Watson, J.W. and McGarigal, K. 1988. Ecology of Bald Eagles on the Lower Columbia River. Oregon Cooperative Wildlife Research Unit, Department of Fisheries and Wildlife, Oregon State University, Corvallis, Oregon. Final report to the U.S. Army Corps of Engineers.
- Geotechnical Resources, Inc. 1991 (October). Draft Geotechnical Investigation: U.S. Navy Mine Hunter Vessel Facility, South Tongue Point, Astoria, Oregon. Prepared for ABAM Engineers, Federal Way, Washington.
- Godfrey, R. K. and J. W. Wooten. 1981. Aquatic and Wetland Plants of Southeastern United States. The University of Georgia Press, Athens, Georgia.
- Haertel, L. and C. Osterberg. 1967. "Ecology of Zooplankton, Benthos and Fisheries in the Columbia River Estuary." Ecology 48(3):459-472.
- Haertel, L., C. Osterberg, H. Carl, Jr., and P. Kilhopark. 1969. "Nutrient and Plankton Ecology of the Columbia River Estuary." Ecology 50:962-978.
- Hazel, C.R. et al. 1984. Avifauna of the Columbia River Estuary. Jones and Stokes Associates, Inc., Bellevue, Washington. Final Report on the Avifauna Work Unit of the Columbia River Estuary Data Development Program.
- Healey, M.C. 1980. "Utilization of Nanaimo River Estuary by Juvenile Chinook Salmon, *Oncorhynchus tshawytscha*." Fishery Bulletin 77:653-668.
- Healey, M.C. 1982. "Juvenile Pacific Salmon in Estuaries: The Life Support System." pp. 315-341 in: V.S. Kennedy (ed.), Estuarine Comparisons. Academic Press, New York, New York.
- Hepner, J. Operations Division, U.S. Army Corps of Engineers, Portland Office. Personal Communication. Facsimile Communication: November 19, 1991.
- Herring, M.L. and J.W. Nicholas. 1983. Draft Juvenile Life History of Wild Chinook Salmon in Coastal Watersheds. Oregon Department of Fish and Wildlife. Information Report draft, Portland, Oregon.

- Higley, D.L. and R.L. Holton. 1978. A Grab-sample Study of Benthic Invertebrates of the Columbia River Estuary. Oregon State University School of Oceanography. Corvallis, Oregon.
- Hubbell, D.W. and J.L. Glenn. 1973. Distribution of Radionuclides in Bottom Sediments of the Columbia River Estuary. Geological Survey Professional Paper 433-L, U.S. Geological Survey. Washington, D.C.
- Ingels, K. 1989. Impacts of the Proposed Tongue Point Development Project on Fish and Wildlife Resources. Portland Ecological Services Field Office, U.S. Fish and Wildlife Service. Report to the U.S. Army Corps of Engineers, Portland Office.
- Isaacs, F.B. and R.G. Anthony. 1991. Bald Eagle Nest Locations and History of Use in Oregon 1971-1991. Oregon Cooperative Wildlife Research Unit, Oregon State University.
- Isaacs, F.B. 1992 (May 30). Letter. Isaacs (Biologist, Oregon Cooperative Wildlife Research Unit, Department of Fisheries and Wildlife, Oregon State University) to B. Harrison of the U.S. Fish and Wildlife Service.
- Isaacs, F.B. Biologist, Oregon Cooperative Wildlife Research Unit, Department of Fisheries and Wildlife, Oregon State University. Personal Communication. Telephone Interview: November 5, 1991.
- Isaacs, F.B. Biologist, Oregon Cooperative Wildlife Research Unit, Department of Fisheries and Wildlife, Oregon State University. Personal Communication. Personal Interview: May 25, 1992).
- Jay, D.A. 1984. Circulatory Processes in the Columbia River Estuary. Columbia River Estuary Data Development Program. Columbia River Estuary Study Taskforce, Astoria, Oregon.
- Johnson, R. and N.R. Knapp. 1991 (June). Astoria MHC Homeport Facility. Housing Market Study. Astoria. Oregon. Review Draft. Prepared for the U.S. Navy.
- Jones, K. and D. Bottom. 1984. Zooplankton and Larval Fishes of the Columbia River Estuary. Columbia River Estuary Data Development Program. Columbia River Estuary Study Taskforce, Astoria, Oregon.
- Kammerer, J. 1987 (August). Water Fact Sheet. Open File Report 87-242. U.S. Geological Survey, Department of the Interior.

- Keeler, R.W. 1981 (November). A Cultural Resources Inventory of Certain Lands in the Astoria Area that were formerly a part of the Tongue Point Naval Air Station. Oregon Division of State Lands.
- Labor Market Information. 1990. Program Year 1990 & 1991: Business & Employment Outlook. Volumes 1, 2 and 3. Department of Human Resources, Employment Division, State of Oregon.
- Levy, D.A. and T.G. Northcote. 1982. "Juvenile Salmon Residency in a Marsh Area of the Fraser River Estuary." Canadian Journal of Fishery and Aquatic Science 39:270-276.
- Loch, J.J. 1982. Juvenile and Adult Steelhead and Sea-run Cutthroat Trout within the Columbia River Estuary 1980. 1982 Annual Report. Washington Department of Game, Fisheries Management Division, Research Section.
- MacHugh, W., D. Christensen, R. Cummings, T. Keel and M. Quinn. 1990 (May). 1990 Statewide Boating Survey: A Report to the Oregon State Marine Board.
- MacKellar, J. Public Affairs Representative, Oregon Department of Environmental Quality, Air Quality Division. Personal Communication. Telephone Interview: November 15, 1991.
- Malek, J. 1990 (May 16). Letter. Malek (Dredging and Ocean Dumping Specialist, U.S. Environmental Protection Agency) to Judy Linton of the U.S. Army Corps of Engineers.
- Mallick, S. Engineer, ABAM Engineers. Personal Communication. Telephone Interview: April 7, 1992.
- Mason, C. Study Manager, U.S. Army Corps of Engineers. Personal Communication. Telephone interview: June 11, 1992.
- McCabe, G.T., Jr. 1991b. Unpublished 1980-81 beach seine data for Mott Island. McCabe (Biologist, National Marine Fisheries Service, Warrenton, Oregon) to C. Huntington (Clearwater BioStudies, Inc.).
- McConnell, R.J., G.R. Snyder, J.T. Durkin and T.H. Blahm. 1979. Concentration, Extent and Duration of Salinity Intrusion into the Columbia River Estuary, September-October 1977-78. Coastal Zone and Estuarine Studies. National Marine Fisheries Service, Seattle, Washington.
- McGarigal, K., Anthony, R.G. and F.B. Isaacs. 1991. Interactions of Bald Eagles and Humans on the Columbia River Estuary. Wildlife Monograph No. 115.



- Miller, J. Technical Information Specialist, U.S. Geological Survey. Personal Communication. Telephone Interview: December 30, 1991.
- McGowan, K. Floodplain Management Specialist, U.S. Army Corps of Engineers. Personal Communication. Telephone Interview: January 22, 1992.
- McIntyre, C.D. and M.C. Amspoker. 1984. Benthic Primary Production in the Columbia River Estuary. Columbia River Estuary Study Taskforce, Astoria, Oregon.
- Minor, R. September 1977. Oregon Archaeological Survey, Site Form No. 35CLT54. Clatsop County.
- Monaco, M.E., D.M. Nelson, R.L. Emmett and S.A. Hinton. 1990. Distribution and Abundance of Fishes and Invertebrates in West Coast Estuaries, Volume I: Data Summaries. ELMR Report No. 4, National Oceanographic and Atmospheric Administration Strategic Environmental Assessment Division, Rockville, Maryland.
- National Marine Fisheries Service. 1991 (November 20). "Endangered and Threatened Species; Endangered Status for the Snake River Sockeye Salmon; Final Rule." Federal Register 50(224):58810-58811.
- Northwest Geological Services, Inc. 1990 (May). Assessment of Seismic Risk, Tsunami Risk, and Effects of Long-Term Global Warming: Proposed Del Rey Beach Destination Resort, Clatsop County, Oregon. Prepared for David Evans and Associates, Inc.
- Ogden Beeman & Associates, Inc.; Benkendorf Associates; and Enviro Science, Inc. 1986 (June). Lower Columbia River: Assessment of Oregon Deep Draft Sites. Prepared for the Oregon Department of Economic Development, Ports Division.
- Ogden Beeman & Associates, Inc. 1992 (April 22). Technical Memorandum: South Tongue Point, John Day Channel in Cathlamet Bay. Prepared for David Evans and Associates, Inc.
- Olhausen, S.K. 1980 (January). Fish Sampling Operations at Tongue Point, Oregon. Special Report. U.S. Fish and Wildlife Service, Fisheries Assistance Office, Vancouver, Washington.
- Oregon Department of Geology and Mineral Industries. 1972. Engineering Map of the Astoria, Oregon Quadrangle.
- Oregon Department of Environmental Quality. 1990. Regulations Relating to Water Quality Control in Oregon: Sections from Oregon Administrative Rules. Chapter 340.

- Oregon Department of Transportation. 1991a (May). U.S. 30 Multimodal Study, Lower Columbia River Corridor. Technical Report and Final Report. Highway Division.
- Oregon Department of Transportation. 1991b (December). Astoria Reroute Traffic Study. Highway Division.
- Oregon Natural Heritage Program. 1991a (May). Rare, Threatened and Endangered Plants and Animals of Oregon. Oregon Natural Heritage Program, Portland, Oregon.
- Oregon Natural Heritage Program. 1991b (July 8). Data Base Search for Warrenton, Svenson, Astoria, and Tillamook Head Quadrangles, Oregon. Oregon Natural Heritage Program, Portland, Oregon.
- Oregon Port Planning and Development Advisory Committee for the Oregon Joint Legislative Committee on Trade and Economic Development. 1991 (February 12). Report on Oregon Lower Columbia River Governance and Management Issues.
- Oregon State Employment Division. 1990. Program Year 1990 & 1991, Business & Employment Outlook, Volume 2: Projections Analysis, JPTA District 1. RS PUB 84B (8-90).
- Powell, Goss & Associates. 1990 (November). Appraisal Report: South Tongue Point & Columbia River Islands, Astoria, Oregon. Prepared for the State of Oregon, Division of State Lands.
- Purchase, S. Assistant Director of Resource Management, Oregon Division of State Lands, Salem. Personal Communication. Telephone Interview: November 20, 1991.
- Radford, A.E., H.E. Ahles and R.C. Bell. 1976. Manual of the Vascular Flora of the Carolinas. The University of North Carolina Press, Chapel Hill, North Carolina.
- Reed, P. 1989. National List of Plant Species that Occur in Wetlands: Northwest (Region 9). Prepared for the National Wetlands Inventory, U.S. Fish and Wildlife Service.
- R&W Engineering, Inc. 1992 (March 11). Noise Study at South Tongue Point. Prepared for David Evans and Associates, Inc.
- Scale, B. Hydrographer, Oregon Water Resources Department. Personal Communication. Telephone Interview: December 30, 1991.
- Scientific Resources, Inc. 1990 (October). Wetland Determination and Delineation at South Tongue Point, Near Astoria, Oregon. Final Report. Prepared for the State of Oregon, Division of State Lands.

- Seaman, M.H., ed. 1977. Columbia River Estuary Inventory of Physical, Biological and Cultural Characteristics. Columbia River Estuary Study Taskforce, Astoria, Oregon.
- Service. See U.S. Fish and Wildlife Service.
- Sherwood, C., J. Creager, E. Roy, G. Gelfenbaum and T. Dempsey. 1984. Sedimentary Processes and Environments in the Columbia River Estuary. Columbia River Estuary Data Development Program. Columbia River Estuary Study Taskforce, Astoria, Oregon.
- Siipole, M. Sediment Specialist, U.S. Army Corps of Engineers. Personal Communication. Telephone Interview: June 11, 1992.
- Simenstad, C.A. and D.M. Eggers. 1981. Juvenile Salmonid and Baitfish Distribution, Abundance and Prey Resources in Selected Areas of Grays Harbor, Washington. Final Report FRI-UW-8116 to U.S. Army Corps of Engineers, Seattle District. Fisheries Research Institute, College of Fisheries, University of Washington, Seattle, Washington.
- Simenstad, C., D. Jay, W. Nehlson, C. McIntyre, C. Sherwood and L. Small. 1984. Dynamics of the Columbia River Estuarine Ecosystem. Columbia River Estuary Data Development Program. Columbia River Estuary Study Taskforce, Astoria, Oregon.
- Simenstad, C.A., L.F. Small, D. McIntire, D.A. Jay and C. Sherwood. 1990. "Columbia River Estuary Studies: An Introduction to the Estuary, a Brief History, and Prior Studies." Progress in Oceanography 25:1-13.
- Simpson, J.C. and R.L. Wallace. 1978. Fishes of Idaho. The University Press of Idaho, Idaho Research Foundation, Inc., Moscow, Idaho.
- Smith, J.G. 1981 (January). Fish Sampling Operations at Tongue Point, Oregon. Addendum Report. U.S. Fish and Wildlife Service, Fisheries Assistance Office, Vancouver, Washington.
- Soil Conservation Service. 1988. Soil Survey of Clatsop County, Oregon (Sheets 6 and 7). U.S. Department of Agriculture in cooperation with the Oregon Agricultural Experiment Station.
- Soil Conservation Service. 1989. Hydric Soils of Clatsop County. U.S. Department of Agriculture in cooperation with the National Technical Committee for Hydric Soils..
- Spencer B. Gross, Inc. 1991 (May). Topographical Survey of South Tongue Point. Prepared for the Oregon Division of State Lands.

- Sweet-Edwards/EMCON, Inc. 1991 (February). Phase I Environmental Assessment, South Tongue Point, Astoria, Oregon. Final Report. Prepared for the State of Oregon, Division of State Lands.
- Thomas, D.W. 1984. "Vascular Flora of the Columbia River Estuary." Washmann Journal of Biology 42(1-2):92-106.
- Thomas, D.W. 1990 (November 28). Letter. Thomas (Botanist) to Duncan and Jane Thomas, Environmental Consultants.
- U.S. Army Corps of Engineers. 1991 (November 5). Letter. W.B. Paynter (Corps, Regulatory) to E. David Blum of the Oregon Division of State Lands.
- U.S. Army Corps of Engineers. 1987 (March). Columbia River Coal Export Channel, Volume III: Environmental Studies. Technical Report, U.S. Army Corps of Engineers, Portland District.
- U.S. Environmental Protection Agency. 1971. Effect of Noise on Wildlife and Other Animals. NT1D300.5. Office of Noise Abatement and Control, Washington, D.C.
- U.S. Fish and Wildlife Service. 1982. Status Reports on Twelve Raptors. Special Scientific Report 238.
- U.S. Fish and Wildlife Service. 1983. Revised Columbian White-tailed Deer Recovery Plan. Prepared in cooperation with the Columbian White-Tailed Deer Recovery Team.
- U.S. Fish and Wildlife Service. 1990. Annual Narrative, Lewis and Clark National Wildlife Refuge.
- U.S. Fish and Wildlife Service. 1992 (May 29). Memorandum. Biologist, Willapa National Wildlife Refuge and Satellites, Cathlamet, Washington to Regional Supervisor, Realty (ARW-RE), Region 1.
- U.S. Geologic Survey. 1986. The Vertical Distribution of Chemicals in Sediments of the Proposed Columbia River Deep-Draft Navigation Channel, Oregon. Oregon Field Office, Portland, Oregon.
- University of Minnesota. 1991. Micro IMPLAN Users Guide, Version 91-09. University of Minnesota, St. Paul, Minnesota and U.S. Forest Service, Fort Collins, Colorado.
- Vorderstrasse, R. 1991. Memorandum (December 20). Vorderstrasse (Acting Field Supervisor, Portland Field Office, U.S. Fish and Wildlife Service) to Ben Harrison of Refuges and Wildlife, Region 1, U.S. Fish and Wildlife Service.



- Watson, J.W. and R.G. Anthony. 1985. Ecology of Bald Eagles in the Tongue Point Area, Lower Columbia River. Oregon Cooperative Wildlife Research Unit, Department of Fisheries and Wildlife, Oregon State University, Corvallis, Oregon.
- Watson, J.W. and R.G. Anthony. 1986. Ecology of Bald Eagles in the Tongue Point Area, Lower Columbia River. Oregon Cooperative Wildlife Research Unit, Department of Fisheries and Wildlife, Oregon State University, Corvallis, Oregon. Final report to the U.S. Army Corps of Engineers.
- Western Highway Institute. 1971. Fundamentals of Noise and Vehicle Exterior Noise Levels.
- Williams-Kuebelbeck and Associates, Inc. 1981 (October). Tongue Point Highest and Best Use Study. Prepared for the State of Oregon Division of State Lands.

## CHAPTER 8.0 GLOSSARY

ABORIGINAL - native to a geographical region; indigenous.

AD VALOREM - in proportion to the value.

ALGAE - any of various primitive, chiefly aquatic, one-celled or multicellular plants that lack true stems, roots, and leaves but usually contain chlorophyll.

ALLUVIUM - any sediment deposited by flowing water.

AMPHIPOD - any of numerous small crustaceans of the order Amphipoda, which includes beach fleas, and other insects having legs on both sides.

ANADROMOUS - migrating up rivers from the sea to spawn in fresh water.

ANNELID - of or belonging to the phylum Annelida, which includes the earthworms, leeches, and other worms having cylindrical segmented bodies.

BENTHIC - bottom-dwelling.

BENTHIC MICROALGAE - algae that lives on the bottom of a body of water.

BIO-ACCUMULATION - the intake and storage by organisms of substances (such as pollutants) from the environment; typically referring to the accumulation of these substances at higher trophic levels (such as predators).

BIOASSAY - the determination of relative strength of a substance (such as a contaminant) by comparing its effect on a test organism with that of a standard or neutral preparation.

BIOCHEMICAL OXYGEN DEMAND (BOD) - the amount of oxygen consumed by microbes in water; high BOD indicates high concentrations of organic chemicals in the water.

BIOFILTER - a type of biological stormwater runoff treatment facility; vegetated indentations in the landscape which may be used where infiltration into the soil is desired.

BIOSWALE - a type of biological stormwater runoff treatment facility; turf grass-vegetated channels with either parabolic or 3:1 horizontal to vertical side slopes, possessing longitudinal slopes in the range of 2 to 6 percent and lengths of 100 to 200 feet or more.

BIOTIC ZONE - of or relating to an area occupied by living beings.

BIVALVE - a mollusk such as an oyster or a clam having a shell consisting of two hinged parts.

BRACKISH - containing a mix of fresh water and salt water.

BREEDING TERRITORY - areas that are actively defended by one or both members of a breeding pair, often through aggressive displays, and are generally centered around the nest site or den site; for most species, breeding territories seldom overlap.

CALANOID COPEPOD - a minute crustacean (copepod) belonging to the Calanoidae family of copepods.

CARRION - dead and putrefying flesh.

CLADOCERAN - any of various small aquatic crustaceans of the order Cladocera, which includes the water fleas.

CLEAN WATER ACT: SECTION 404 - the permit process for filling or removing wetlands (jurisdictional waters of the United States), administered U.S. Army Corps of Engineers.

CONDUCTIVITY - a measure of the ability of a material to conduct an electrical current.

COPEPOD - any of numerous small marine and freshwater crustaceans of the order Copepoda.

CREST MEDIATION PANEL AGREEMENT - a 12-party agreement by local, State, and Federal agencies regarding development of industrial parcels with water access within Clatsop County.

CRUSTACEAN - any of various predominantly aquatic arthropods of the class Crustacea, including lobsters, crabs, shrimps, and barnacles, characteristically having a segmented body, a chitinous exoskeleton, and paired, jointed legs.

CYPRINID - any of numerous, often small, freshwater fishes of the family Cyprinidae, which includes the minnows, caps, and shiners.

DECIBEL, A-WEIGHTED (dBA) - a measure of noise weighted for the sounds to which the human ear is most sensitive.

DDE (dichloro-diphenyl-dichloroethylene) - water-insoluble crystalline insecticide that tends to accumulate in ecosystems and has toxic effects on many vertebrates.

DDT (dichloro-diphenyl-trichloroethane) - a colorless, odorless, water-insoluble crystalline insecticide that tends to accumulate in ecosystems and has toxic effects on many vertebrates; outlawed in the U.S. since 1972.

DDT METABOLITE - a product resulting from the breakdown of DDT by microbes.

DECAPOD - any crustacean of the order Decapoda, such as the crab, lobster, or shrimp, characteristically having five pairs of locomotor appendages, each joined to a segment of the thorax.

DEMERSAL - bottom-oriented marine animal.

DETRITIVORE - an organism that habitually eats detritus (decaying material or debris).

DIATOM - any of various minute, unicellular or colonial algae of the class Bacillariophyceae, having siliceous cell walls consisting of two overlapping, symmetrical parts.

DIOXIN - any of several heterocyclic hydrocarbons that occur as persistent toxic impurities in herbicides; suspected carcinogen.

DIPTERA - a large order of insects which includes the true flies and mosquitos, characterized by a single pair of membranous wings.

DIURNAL - pertaining to or occurring in a day or each day; species that are active during the day and inactive during the night.

DRAFT - the depth of water that a vessel needs in order to float; shallow-draft vessels require water depths of less than 22 feet MLLW; moderate-draft vessels require water depths between 18 and 25 feet MLLW; deep-draft vessels require water depths of more than 22 feet MLLW.

DREDGE - soil material that is scooped or sucked from the bottom of a waterway in the process of deepening a river, harbor, or channel.

ECOSYSTEM - an ecological community together with its physical environment, considered as a unit.

ENDANGERED SPECIES - a species which is in danger of extinction throughout all or a significant portion of its range. Endangered species are afforded protection under the Endangered Species Act of 1973, as amended, and State laws.

ENVIRONMENT - all the biotic and abiotic factors surrounding and acting upon an individual organism or ecological community at any point in its life cycle.

ENVIRONS - an adjoining region or space; surroundings; vicinity.

EPIBENTHIC - pertaining to aquatic organisms which inhabit the water level just above the bottom of a body of water.



ESTUARINE INVERTEBRATE - an invertebrate organism living in estuary waters.

ESTUARY - an arm of the sea that extends inland to meet the mouth of a river; a confined coastal water body with an open connection to the sea and a mix of fresh and salt waters.

FAUNA - all the animal life in a given region or period of time.

FURANS - a family of organic compounds similar in structure to dioxins; often formed as by-products of chemical reactions and as combustion products. Chlorinated furans are considered hazardous waste.

GLYCOL - a colorless alcohol used as an antifreeze in cooling and heating systems.

HABITUATE - to accustom by frequent repetition or prolonged exposure.

HEAVY METALS - metals with densities greater than 5 grams per cubic centimeter.

HOME RANGE - an area where eagles actively forage. The size of home ranges and the degree to which they overlap varies with the season; home ranges overlap more in the winter than in the summer.

HYDRAULIC FLUID - liquid or gas used to transmit a force from one place to another, e.g., brake fluid in a car.

HYDRIC - pertaining to, characterized by, or requiring considerable moisture.

HYDROELECTRIC - producing electricity from the energy of running water.

HYDROGRAPHY - the scientific description and analysis of the physical conditions, boundaries, flow, and related characteristics of oceans, lakes, rivers, and other surface waters.

IMPLAN - Impact Analysis for Planning; an input-output model used for demographic and economic analysis.

INTERTIDAL AREA - the area between high and low tide levels.

INVERTEBRATE - any animal without a dorsal column of vertebrae; includes protozoans to amphioxus.

JUAN DE FUCA PLATE - a geo-tectonic plate in the Pacific Ocean off the coast of Oregon and Washington.

**LAND CAPABILITY CLASS** - a system used by the Soil Conservation Service to measure soil qualities including productivity and erosion potential.

**LEVEL OF SERVICE (LOS)** - pertains to a measurement of vehicle waiting times at intersections and reflects the capacity of streets to support traffic.

**LIQUEFACTION** - the process of a solid becoming a liquid due to heat, possibly caused by friction.

**MACROPHYTE** - visible phytoplankton.

**MAMMAL** - any of a class of higher vertebrates comprising animals that nourish their young with milk secreted by mammary glands and have skin usually more or less covered by hair.

**MARAD BASIN** - the Marine Administration Basin; an area of open water adjacent to South Tongue Point within Cathlamet Bay that was dredged in the 1950s; also called Mott Basin.

**MARINE PELAGIC** - ocean-dependent (see also Pelagic).

**MARINE** - pertaining to or inhabiting the sea, ocean, or other salt waters.

**MICROALGAE** - microscopic plant species.

**MIGRATORY BIRDS** - birds that change location periodically or move seasonally from one region to another.

**MINEHUNTER COASTAL CRAFT** - marine vessels that conduct hydrographic surveys of the river, bay, and ocean floor areas to support the U.S. Navy battlefleet and maintain safe harbors for domestic marine traffic; these vessels do not detonate mines, nor do they have nuclear capabilities.

**MITIGATION MEASURES** - actions to reduce or avoid identified impacts.

**MEAN LOWER LOW WATER (MLLW)** - of the two daily low tides, MLLW is the average of the lower tide over a 19-year lunar cycle; equivalent to 3 feet below NGVD. MLLW is commonly used as a datum for navigation charts and tide tables.

**MOLLUSK** - any invertebrate of the Phylum Mollusca comprising the chitons, snails, bivalves, squids, octopuses, etc., typically having a calcareous shell of one, two, or more pieces that wholly or partially enclose the soft, unsegmented body.

**MYSID** - a type of shrimp reaching a maximum of 3 centimeters, also known as opossum shrimp because it carries its young for three months after hatching.

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) - requires Federal agencies to document alternatives and evaluate impacts of major actions in environmental impact statements (EISs).

NATIONAL GEODETIC VERTICAL DATUM (NGVD) - the average sea level; approximately equivalent to 3 feet above MLLW. NGVD is commonly used as a datum for topographic maps.

NORTH AMERICAN PLATE - a geo-tectonic plate including Oregon and Washington.

NUTRIA - a large, grayish-brown, aquatic rodent with a long, round, scantily haired tail. Hind feet are large and webbed.

OAR - Oregon Administrative Rules.

OLIGOCHAETE - any of various worms of the class Oligochaeta, including the earthworms.

OMNIVOROUS - pertaining to organisms that eat both animal and vegetable substances.

ORGANOCHLORIDE - of, relating to, or belonging to the group of chlorinated hydrocarbon pesticides (such as DDT).

ORTHOPHOSPHATE - an organophosphorus pesticide.

OSMERID - belonging to the Osmeridae family of fishes.

OSTRACOD - any of various minute, chiefly freshwater crustaceans of the order Ostracoda having a bivalve carapace.

PARTICULATE - of or relating to minute separate particles.

PCB (polychlorinated biphenyl) - stable chemical commonly used as insulating and heat transfer fluid, e.g., in electrical transformers.

PELAGIC - living in open oceans or seas rather than waters adjacent to land or inland water.

PETROLEUM HYDROCARBON - a natural, yellow-to-black, thick, flammable liquid hydrocarbon mixture processed for natural gas, gasoline, kerosene, asphalt, and other products.

pH - unit of measurement of acidity and alkalinity, with a measurement of 7 being neutral.

PHENOL CONCENTRATE - a caustic, poisonous, white, crystalline, compound derived from benzene and used in various resins, plastics, disinfectants, and pharmaceuticals.

PHOTOSYNTHESIS - the process by which chlorophyll-containing cells in green plants convert incident light to chemical energy and synthesize organic compounds from inorganic compounds.

PHYTOPLANKTON - minute plant material found in the water column.

PISCIVOROUS - pertaining to organisms that habitually feed on fish.

PLANKTIVOROUS - pertaining to organisms that habitually feed on plankton.

POLYCHAETE - any of various marine worms of the class Polychaeta having paired, flattened, bristle-tipped organs of locomotion.

POLYNUCLEAR AROMATIC HYDROCARBONS (PAH) - also called polycyclic aromatic hydrocarbons; organic chemicals commonly found in gasoline.

PRECIPITATION - any form of rain, hail, sleet, mist, fog, or snow.

RADIOISOTOPE - a naturally or artificially produced radioactive isotope of an element.

RIVER AND HARBOR ACT: SECTION 10 - the permit process for placing structures in navigable waters, administered by the U.S. Army Corps of Engineers.

RM - River Mile.

ROTIFER - any of various minute, multi-cellular, aquatic organisms of the phylum Rotifera having a wheel-like ring of cilia at the anterior end.

SALINITY - the concentration of dissolved solids or salt in water.

SALMONID - resembling or characteristic of a salmon; of or belonging to the family Salmonidae, which includes salmon, trout, and whitefish.

SEDIMENT - material that settles to the bottom of liquid or air.

SEDIMENTATION - the act or process of depositing sediment.

SEISMIC ZONE - area subject to earthquake or earth vibrations.

SENSITIVE SPECIES - those plant or animal species that have been identified by Federal, State, or local agencies, or by conservation groups as being either threatened with extinction, rare, declining in population, unusual (such as species occurring outside of its usual range) or of other special interest, or vulnerable to impacts.



SERIAL - pertaining to a succession of plant communities in a given habitat leading to a particular climax association; a stage in a community succession.

SHOALING RATE - rate of sedimentation.

SILT - a sedimentary material consisting of fine mineral particles intermediate in size between sand and clay.

SPL - Sound Pressure Level; a measurement of noise.

STATEWIDE PLANNING GOALS - Oregon's land use planning system created in 1973 and including 19 goals; local comprehensive plans implement the Statewide Planning Goals.

STORET - U.S. Environmental Protection Agency software database of measurements of conventional water quality parameters.

SUBDUCTION ZONE - an area where one geo-tectonic crustal plate descends below another; often an area of seismic activity.

SUBTIDAL - an area below the lowest tidal range.

TAXA - a group of organisms constituting one of the categories or formal units in taxonomic classification, such as the phylum, order, family, genus, or species, and characterized by common characteristics in varying degrees of distinction.

THREATENED SPECIES - a species threatened by the possibility of extinction. Threatened species are afforded protection under the Endangered Species Act of 1973, as amended, and State laws.

TIDAL - relating to the periodic rising and falling or flowing and ebbing of ocean waters.

TOPOGRAPHY - the graphical description on a map of the exact physical configuration of a place or region; the features of a place or region.

TOXIC - harmful, destructive, or deadly; poisonous.

TRIBUTARY DISCHARGE - sediments deposited when a stream or river flows into a larger body of water.

TROPHIC - of or pertaining to nutrition or the nutritive processes; typically used to describe where a species occurs in the "food chain" (e.g., predators such as bald eagles occur at the highest trophic level).

TROPOPSAMMENTS - soils formed in stratified dredge spoils.

TSUNAMI - a very large ocean wave often caused by an underwater earthquake, volcanic eruption, or powerful storm; often referred to as a tidal wave.

TURBIDITY - sediment or foreign particles stirred up or suspended in water; muddy; cloudy.

WETLANDS - areas of land containing soil moisture; as defined by Federal agencies, wetlands are areas that contain soils showing signs of frequent and/or sustained inundation, plant species adapted to wet conditions, and signs of water movement through the area.

ZOOPLANKTON - minute plant life found in the water column.

## 9.0 INDEX

| <u>Section</u>                                                                   | <u>Page</u>            |
|----------------------------------------------------------------------------------|------------------------|
| Affected Environment . . . . .                                                   | 3-1                    |
| Air Quality . . . . .                                                            | 3-15, 4-10             |
| Alternative A . . . . .                                                          | 2-20                   |
| Alternative B . . . . .                                                          | 2-26                   |
| Alternative C . . . . .                                                          | 2-27                   |
| Alternative Developments . . . . .                                               | 2-11                   |
| Alternative Locations for a Marine Industrial Park . . . . .                     | 2-3                    |
| Alternative Multi-Tenant Concepts . . . . .                                      | 2-11, 2-15, 2-16, 2-19 |
| Alternative Single-Tenant Development Concepts . . . . .                         | 2-17, 2-18, 2-19, 2-20 |
| Alternatives Compared . . . . .                                                  | 4-49                   |
| Alternatives Considered for Detailed Study . . . . .                             | 2-2, 2-20              |
| Alternatives Eliminated from Further Study . . . . .                             | 2-1, 2-2               |
| Alternatives to Land Exchange . . . . .                                          | 2-2                    |
| Aquatic Topography and Site Description . . . . .                                | 3-3, 4-2               |
| Archaeological Issues . . . . .                                                  | 3-56, 4-45             |
| Astoria Plywood . . . . .                                                        | 2-7                    |
| Bald Eagles . . . . .                                                            | 3-42, 4-29, 4-38       |
| Biological Environment . . . . .                                                 | 3-22, 3-59, 4-21, 4-47 |
| Camping and Picnicking . . . . .                                                 | 3-63                   |
| Climate and Weather . . . . .                                                    | 3-2, 3-59              |
| Coastal Zone Management Act of 1972 . . . . .                                    | 5-1                    |
| Compensation for Project Impacts . . . . .                                       | 4-53, 4-54             |
| Compliance, Consultation, and Coordination . . . . .                             | 5-1                    |
| Comprehensive Environmental Responses, Compensation, and Liability Act . . . . . | 5-1                    |
| Comprehensive Plan and Zoning Designations . . . . .                             | 3-47, 5-3              |
| Coordination with Federal, State, and Local Agencies . . . . .                   | 5-2                    |
| Cultural . . . . .                                                               | 3-55, 4-45             |
| Cultural and Social Environment . . . . .                                        | 3-47, 3-62, 4-39, 4-48 |
| Cumulative Impacts . . . . .                                                     | 4-55                   |
| Decision-Making Process . . . . .                                                | 1-5                    |
| Development of Site . . . . .                                                    | 3-55                   |
| Distribution of Draft EIS . . . . .                                              | 5-8                    |
| Division of State Lands . . . . .                                                | 1-1                    |
| Drainage . . . . .                                                               | 3-14                   |
| Dredging . . . . .                                                               | 1-4                    |
| East Astoria . . . . .                                                           | 2-7                    |
| East Hammond . . . . .                                                           | 2-10                   |
| East Skipanon . . . . .                                                          | 2-9                    |

## INDEX, cont'd.

| <u>Section</u>                                                                           | <u>Page</u>                       |
|------------------------------------------------------------------------------------------|-----------------------------------|
| Employment . . . . .                                                                     | 3-50, 4-43                        |
| Endangered Species Act of 1973 . . . . .                                                 | 5-1                               |
| Environmental Consequences . . . . .                                                     | 4-1                               |
| Environmental Review and Consultation . . . . .                                          | 5-1                               |
| Executive Orders . . . . .                                                               | 5-2                               |
| Existing Uses at South Tongue Point . . . . .                                            | 3-49                              |
| Federal Legislative Acts . . . . .                                                       | 5-1                               |
| Fiscal . . . . .                                                                         | 3-54, 4-44                        |
| Fish and Wildlife . . . . .                                                              | 3-27, 3-60, 4-24, 4-47, 4-48, B-1 |
| Fishing . . . . .                                                                        | 3-63                              |
| Flood Plain Management -- Executive Order 11988 . . . . .                                | 5-2                               |
| Flood Plains (see Water Courses and Flood Plains)                                        |                                   |
| Geologic Hazards . . . . .                                                               | 3-5                               |
| Geology . . . . .                                                                        | 3-4, 4-3                          |
| Glossary . . . . .                                                                       | 8-1                               |
| Groundwater . . . . .                                                                    | 3-13, 4-6                         |
| Hammond Boat Basin . . . . .                                                             | 2-10                              |
| Hazardous Materials, Sediments . . . . .                                                 | 3-21, 3-59, 4-20                  |
| Hazardous Materials, Uplands . . . . .                                                   | 3-20, 3-59, 4-18                  |
| Historic Issues . . . . .                                                                | 3-55                              |
| Historical, Archaeological, and Scientific Properties -- Executive Order 11593 . . . . . | 5-2                               |
| Houseboats . . . . .                                                                     | 3-63                              |
| Housing . . . . .                                                                        | 3-54, 4-42                        |
| Hunting . . . . .                                                                        | 3-62                              |
| Hydraulics and Hydrology . . . . .                                                       | 3-7, 4-5                          |
| Irreversible and Irretrievable Commitments of Resources . . . . .                        | 4-54                              |
| Islands, Affected Environment . . . . .                                                  | 3-57                              |
| Islands, Environmental Consequences . . . . .                                            | 4-46                              |
| Land Exchange . . . . .                                                                  | 2-20                              |
| Land Use . . . . .                                                                       | 3-47, 3-62, 4-39, 4-48            |
| Mediation Panel Agreement . . . . .                                                      | 1-5                               |
| Mitigation Measures . . . . .                                                            | 4-49, C-1                         |
| Multi-Tenant Marine Industrial Development at South Tongue Point . . . . .               | 2-21                              |
| National Wildlife Refuge System Administration Act of 1966 . . . . .                     | 5-2                               |
| Navy . . . . .                                                                           | 2-23                              |
| No Action Alternative (see Alternative C)                                                |                                   |
| Noise and Activity . . . . .                                                             | 3-15, 4-11                        |
| Non-Salmonids . . . . .                                                                  | 3-33                              |



## INDEX, cont'd.

| <u>Section</u>                                                   | <u>Page</u>            |
|------------------------------------------------------------------|------------------------|
| North Tongue Point . . . . .                                     | 2-5, 2-16, 2-18        |
| Nuclear Capabilities of Navy Ships . . . . .                     | 1-5                    |
| Organization of the EIS . . . . .                                | 1-6                    |
| Phase 1 . . . . .                                                | 2-22                   |
| Phase 2 . . . . .                                                | 2-25, 2-26             |
| Physical Environment . . . . .                                   | 3-1, 3-57, 4-1, 4-46   |
| Plant Communities . . . . .                                      | 3-23, 4-21             |
| Population . . . . .                                             | 3-49, 4-41             |
| Port of Astoria Docks . . . . .                                  | 2-8                    |
| Preferred Alternative (see Alternative A)                        |                        |
| Preparers, List of . . . . .                                     | 6-1                    |
| Project Location . . . . .                                       | 3-1, 3-57              |
| Public Facilities . . . . .                                      | 3-18, 4-15             |
| Public Involvement . . . . .                                     | 5-7                    |
| Public Use . . . . .                                             | 3-62, 4-48             |
| Purpose of and Need for Action . . . . .                         | 1-1                    |
| References Cited . . . . .                                       | 7-1                    |
| Salmonids . . . . .                                              | 3-30, 3-40, 4-28, 4-38 |
| Sanitary Sewer . . . . .                                         | 3-19, 4-17             |
| Scoping . . . . .                                                | 1-3, A-1               |
| Sediments . . . . .                                              | 3-5, 3-59, 4-4, 4-46   |
| Shading Impacts . . . . .                                        | 4-22                   |
| Shared Agency Needs and Responsibilities . . . . .               | 1-3                    |
| Short-Term Uses versus Long-Term Productivity . . . . .          | 4-55                   |
| Socioeconomic . . . . .                                          | 3-49, 4-39             |
| Soils . . . . .                                                  | 3-4, 3-59, 4-3, 4-46   |
| South Astoria . . . . .                                          | 2-8                    |
| South Tongue Point, Affected Environment . . . . .               | 3-1                    |
| South Tongue Point, Environmental Consequences . . . . .         | 4-1                    |
| Spoil Island Grasslands . . . . .                                | 3-59, 4-47             |
| Statewide Planning Goals . . . . .                               | 5-3                    |
| Storm Drainage . . . . .                                         | 3-19, 4-16             |
| Surface Water Quality . . . . .                                  | 3-8, 4-5               |
| Tansy Point . . . . .                                            | 2-10                   |
| Threatened, Endangered, and Sensitive Species . . . . .          | 1-4, 3-61, 4-48        |
| Threatened, Endangered, and Sensitive Plant Species . . . . .    | 3-25, 4-21             |
| Threatened, Endangered, and Sensitive Wildlife Species . . . . . | 3-40, 4-28             |
| Topography and Site Description . . . . .                        | 3-2, 3-58, 4-46        |
| Transportation . . . . .                                         | 3-18, 4-15             |

## INDEX, cont'd.

| <u>Section</u>                                                                           | <u>Page</u>                |
|------------------------------------------------------------------------------------------|----------------------------|
| U.S. Army Corps of Engineers . . . . .                                                   | 1-2, 2-24                  |
| U.S. Fish and Wildlife Service . . . . .                                                 | 1-2                        |
| U.S. General Services Administration . . . . .                                           | 1-3                        |
| Unavoidable Adverse Impacts . . . . .                                                    | 4-49                       |
| Uniform Relocation Assistance and Real Property Acquisition Policy Act of 1970 . . . . . | 5-1                        |
| Upland Topography and Site Description . . . . .                                         | 3-2, 4-1                   |
| Utilities . . . . .                                                                      | 3-20, 4-18                 |
| Vegetation . . . . .                                                                     | 3-22, 4-21, B-1            |
| Visual Resources . . . . .                                                               | 3-57, 4-45                 |
| Warrenton Boat Basin . . . . .                                                           | 2-9                        |
| Water Courses and Flood Plains . . . . .                                                 | 3-14, 4-7                  |
| Water Supply . . . . .                                                                   | 3-19, 4-17                 |
| West Skipanon . . . . .                                                                  | 2-9                        |
| Wetlands -- Executive Order 11990 . . . . .                                              | 5-2                        |
| Wetlands . . . . .                                                                       | 3-14, 3-58, 4-8, 4-21, C-1 |
| Wildlife (see Fish and Wildlife)                                                         |                            |
| Zoning (see Comprehensive Plan and Zoning)                                               |                            |

**APPENDIX A**  
**SCOPING REPORT**

**SOUTH TONGUE POINT LAND EXCHANGE  
AND MARINE INDUSTRIAL PARK  
DEVELOPMENT PROJECT**

**ENVIRONMENTAL IMPACT STATEMENT  
SCOPING REPORT**

**APRIL 1992**



ENVIRONMENTAL IMPACT STATEMENT SCOPING REPORT FOR THE  
SOUTH TONGUE POINT LAND EXCHANGE AND  
MARINE INDUSTRIAL PARK DEVELOPMENT PROJECT

PROJECT SUMMARY

Project Description:

The U.S. General Services Administration (GSA) is proposing to convey approximately 105 acres of land administered by the U.S. Army Corps of Engineers (Corps) to the Oregon Division of State Lands (Division). In exchange for the Federal land, the Division is proposing to convey State-owned land of equal value, within the administrative boundary of Lewis and Clark National Wildlife Refuge (Refuge), to the GSA who will in turn transfer those lands to the U.S. Fish and Wildlife Service (Service). The Division is proposing to develop a marine industrial park on the property conveyed to them. Development plans include a seven-acre site to homeport two Navy mine hunter coastal vessels and a variety of water dependent and general industrial uses. Water dependent uses would have water access by means of pile-supported piers. General industrial uses would be located in upland areas without water access.

Project Purpose:

This development activity is intended to create real property assets and associated income for the Common School Fund of the State of Oregon, encourage new industrial employment within the area, and contribute to the economic stability and employment diversification of Clatsop County and the State of Oregon. Under the proposed action, the Service would gain fee title to lands within the administrative boundary of the Refuge. This would provide the Service with the needed management flexibility to protect and enhance wildlife populations and their habitats.

Scope of Environmental Impact Statement (EIS):

The EIS will discuss and analyze the proposed land exchange and various alternatives for the development of a industrial park in the Astoria area.

Need for Action:

In spite of a wealth of natural resources associated with Clatsop County, Oregon, this area has been subject to increasingly poor economic conditions in the last decade. In order to enhance the economic well being of the citizens of Clatsop County and enhance the economic well being of the State of Oregon, the Division, an agency of the State of Oregon, has initiated an economic development project within Clatsop County.

The above mentioned Federal agencies need to be a part of the proposed land exchange and development plan due to their following responsibilities:

**U.S. General Services Administration** - The United States under the authority of Executive Order Survey 11954, dated January 7, 1977 as amended by Executive Order Survey 12512, dated April 29, 1985, has recommended excessing 104.84 acres of property administered by the Army Corps of Engineers. GSA is the Federal agency responsible for disposing of excess Federal lands, in this case, by negotiated exchange to the State of Oregon in accordance with Part 101-47 of the Federal Property Management Regulations (41 CFR 101-47).

U.S. Army Corps of Engineers - The United States under the authority of Executive Order Survey 11954, dated January 7, 1977 as amended by Executive Order Survey 12512, dated April 29, 1985, has recommended excessing 104.84 acres of property administered by the Army Corps of Engineers. The Corps has regulatory authority over activities occurring in the waters of the United States under Section 10 of the River and Harbor Act and Section 404 of the Clean Water Act.

U.S. Fish and Wildlife Service - The Service has protection responsibilities for migratory birds, threatened and endangered species and certain anadromous fish and their habitats. Under the proposed land exchange, the Service would gain fee title ownership to certain lands within the administrative boundary of Lewis and Clark National Wildlife Refuge (Refuge).

Lewis and Clark National Wildlife Refuge is administered in part under a 50 year cooperative management agreement with State of Oregon. The cooperative agreement was initiated in 1972. Once the cooperative agreement has expired, there is no guarantee another cooperative agreement will be enacted.

In order to maximize protection for migratory fish and wildlife and enhance wildlife habitats, the Service needs fee title ownership of the lands within the Refuge. Fee title ownership would provide the Service with the necessary control and management flexibility to enhance wildlife populations and their habitats in perpetuity.

#### Decision Making:

The EIS is a cooperative effort between the Service, Corps, GSA, and the Division. The Service is the lead agency.

The EIS will provide a comprehensive analysis of alternative development plans. Furthermore, the EIS will outline the rationale for Service, GSA, and Corps decision makers to select a development plan which to obtain the agencies' goals and objectives. These goals and objectives include State economic development goals, minimizing environmental impacts, and consistence with Federal and State statues and regulations.

The environmental review of this project will be conducted in accordance with the requirements of NEPA, 42 U.S.C., et seq., Council for Environmental Quality Regulations for Implementing NEPA, 40 CFR 1500, et seq., other appropriate Federal regulations, and Service, GSA, and Corps policy for compliance with those regulations.

After the completion of this EIS, the responsible official of each agency will prepare its own Record of Decision based upon its particular actions and the findings of the EIS.

#### PUBLIC INVOLVEMENT PROCESS

From April 1990 to January 1992, five (5) public meetings, seven (7) formal hearings and numerous information meetings have been conducted by the Division in an effort to identify issues and concerns associated with the proposed project.

On November 4, 1991 the Notice of Intent to prepare an EIS was published in the Federal register. The Notice of Intent indicated that the scoping period would be open until November 29, 1991.

Also, a Service issued Public Notice announcing the EIS effort and associated scoping efforts and comment period was provided to Portland and Astoria area newspapers, Federal, State, and local agencies in addition to numerous private citizens and private organizations.

## ISSUES AND CONCERNS

During the scoping period the Service received six letters. The following list of key issues and concerns was developed based on scoping period comments and the issues identified during the Division sponsored meetings and hearings.

### KEY ISSUES AND CONCERNS

IMPACTS TO BALD EAGLES  
IMPACTS TO FISHERY RESOURCES  
IMPACTS TO LISTED ENDANGERED FISH AND CANDIDATE FISH  
IMPACTS TO VEGETATION, RARE PLANTS, WETLANDS  
IMPACTS OF DREDGING  
IMPACTS OF CONTAMINANTS RELEASED DURING DREDGING  
NEED TO STIMULATE LOCAL ECONOMY  
POSITIVE VALUE OF THE NAVY TO THE COMMUNITY  
IMPACTS OF NEW HIGHWAY 30 ALIGNMENT AND CROSSINGS  
MEDIATED PANEL AGREEMENT  
IMPACTS TO WETLANDS  
IMPACTS TO WATER QUALITY  
STORMWATER MANAGEMENT  
ACCESS ROAD CONNECTING NORTH AND SOUTH TONGUE POINT  
MITIGATION FOR ADVERSE IMPACTS TO NATURAL RESOURCES  
ALTERNATIVE SITES, LAND USE PLANNING ALTERNATIVES  
ECONOMIC COSTS AND BENEFITS  
IMPACTS TO LOCAL AND REGIONAL ECONOMY  
NEED FOR DETAILED DEVELOPMENT PLANS, (PHYSICAL AND TEMPORAL)  
WETLAND BUFFERS, BUFFERS FROM HUMAN ACTIVITY  
NUCLEAR CAPABILITIES OF NAVY SHIPS

### RANGE OF ALTERNATIVES TO BE CONSIDERED IN THE EIS

Following is the list of alternatives planned for discussion and analysis in the EIS.

#### - NO ACTION ALTERNATIVE

#### - LAND EXCHANGE ALTERNATIVES

Exchange of other State-owned lands for South Tongue Point.  
GSA Disposal to other Federal agencies.  
Sale by GSA to private interests.  
Delay of disposal by GSA.

#### - DEVELOPMENT ALTERNATIVES

Multi-tenant Marine Industrial Park (includes 7 different multi-tenant development configurations).  
Single-tenant development at South Tongue Point.  
Smaller multi-tenant development at South Tongue Point.  
Non-water-related development at South Tongue Point.  
Maximum build-out at North and South Tongue Point.  
Multi-tenant development at another location.  
Single-tenant development for the Navy at North Tongue Point.

### EIS SCHEDULE

|               |                                           |
|---------------|-------------------------------------------|
| December 1991 | Begin Preparation of EIS                  |
| June 1992     | Publish Draft EIS for comment and review. |
| August 1992   | Conduct Public Meetings on Draft EIS      |
| November 1992 | Publish Final EIS                         |
| December 1992 | Prepare Record of Decision                |
| March 1992    | Publish Record of Decision                |

#### APPENDIX

Appendix A, under separate cover, is a synopsis of the information meetings and public hearings which have occurred to date. Also included are copies of the letters received during the scoping period.



**APPENDIX B**  
**SPECIES LISTS**

**TABLE 1**  
**PLANT SPECIES OBSERVED AT SOUTH TONGUE POINT**

| Scientific Name                        | Common Name                 |
|----------------------------------------|-----------------------------|
| <b>TREES, SHRUBS, AND VINES</b>        |                             |
| <i>Acer circinatum</i>                 | vine maple                  |
| <i>Acer macrophyllum</i>               | big-leaf maple              |
| <i>Alnus rubra</i>                     | red alder                   |
| <i>Cytisus scoparius</i>               | Scot's broom                |
| <i>Gaultheria shallon</i>              | salal                       |
| <i>Hedera helix</i>                    | English ivy                 |
| <i>Ilex aquifolium</i>                 | English holly               |
| <i>Lonicera involucrata</i>            | black twinberry             |
| <i>Oemleria cerasiformis</i>           | Indian plum                 |
| <i>Populus balsamifera trichocarpa</i> | balsam cottonwood           |
| <i>Pseudotsuga menziesii</i>           | Douglas fir                 |
| <i>Quercus garryana</i>                | Oregon oak                  |
| <i>Rhamnus purshiana</i>               | cascara                     |
| <i>Rubus discolor</i>                  | Himalayan blackberry        |
| <i>Rubus laciniatus</i>                | evergreen blackberry        |
| <i>Rubus parviflorus</i>               | thimbleberry                |
| <i>Rubus spectabilis</i>               | salmonberry                 |
| <i>Salix hookeriana</i>                | Hooker's willow             |
| <i>Salix lasiandra</i>                 | Pacific willow              |
| <i>Salix sitchensis</i>                | sitka willow                |
| <i>Sambucus racemosa</i>               | red elderberry              |
| <i>Spiraea douglasii</i>               | Douglas's spiraea           |
| <i>Thuja plicata</i>                   | western redcedar            |
| <i>Tsuga heterophylla</i>              | western hemlock             |
| <b>HERBS</b>                           |                             |
| <i>Cirsium vulgare</i>                 | common thistle              |
| <i>Galium aparine</i>                  | catchweed bedstraw          |
| <i>Hypericum perforatum</i>            | common St. John's-wort      |
| <i>Impatiens capensis</i>              | Columbia River touch-me-not |
| <i>Lysichitum americanum</i>           | skunk cabbage               |

TABLE 1, cont'd

## PLANT SPECIES OBSERVED AT SOUTH TONGUE POINT

| <u>Scientific Name</u>             | <u>Common Name</u>       |
|------------------------------------|--------------------------|
| <b>HERBS, cont'd</b>               |                          |
| <i>Oenanthe sarmentosa</i>         | Pacific water-parsley    |
| <i>Penthorum sedoides</i>          | Ditch stonecrop          |
| <i>Ranunculus repens</i>           | creeping buttercup       |
| <i>Rumex crispus</i>               | curly dock               |
| <i>Sagittaria latifolia</i>        | wapato                   |
| <i>Siun sauve</i>                  | hemlock water-parsley    |
| <i>Typha angustifolia</i>          | common cattail           |
| <i>Typha latifolia</i>             | narrow-leaved cattail    |
| <i>Veronica Sp.</i>                | speedwell species        |
| <b>GRASSES, SEDGES, AND RUSHES</b> |                          |
| <i>Agropyron repens</i>            | quackgrass               |
| <i>Ammophila arenaria</i>          | European beachgrass      |
| <i>Carex obnupta</i>               | slough sedge             |
| <i>Carex Lyngbyei</i>              | Lyngbyei's sedge         |
| <i>Dactylis glomerata</i>          | orchard-grass            |
| <i>Elymus mollis</i>               | American dune grass      |
| <i>Festuca rubra</i>               | red fescue               |
| <i>Holcus lanatus</i>              | velvetgrass              |
| <i>Juncus effusus</i>              | common rush              |
| <i>Phalaris arundinacea</i>        | Reed canary-grass        |
| <i>Scirpus microcarpus</i>         | small-fruited bulrush    |
| <b>FERNS AND FERN-ALLIES</b>       |                          |
| <i>Adiantum pedatum</i>            | northern maidenhair fern |
| <i>Dryopteris dilatata</i>         | mountain woodfern        |
| <i>Dryopteris expansa</i>          | spreading woodfern       |
| <i>Equisetum arvense</i>           | marsh horsetail          |
| <i>Equisetum hyemale</i>           | common horsetail         |
| <i>Equisetum telmateia</i>         | giant horsetail          |
| <i>Polystichum munitum</i>         | swordfern                |

TABLE 2

**FRESHWATER AND BRACKISH-TOLERANT ZOOPLANKTON TAXA WHICH  
HAVE BEEN FOUND IN AREAS OF THE COLUMBIA RIVER ESTUARY SIMILAR  
TO SOUTH TONGUE POINT, OREGON**

**CLADOCERANS**

*Alona affinis*  
*Alona costata*  
*Alona quadrangularis*  
*Bosmina longirostris*  
*Camptocercus rectirostris*  
*Ceriodaphnia pulchella*  
*Chydorus globosus*  
*Chydorus sphaericus*  
*Daphnia gateata mendotae*  
*Daphnia longispina*  
*Daphnia pulex*  
*Diaphanosoma brachyurum*  
*Eurycercus lamellatus*  
*Ilyocryptus sordius*  
*Leptodora kindtii*  
*Leydigia acanthocercoides*  
*Leydigia quadrangularis*  
*Macrothrix sp.*  
*Moina brachiata*  
*Monospilus dispar*  
*Pleuroxis denticulatus*  
*Pleuroxis striatus*  
*Sida crystallina*  
*Simoncephalis serrulatus*

**COPEPODS**

*Bryocamptus heimalis*  
*Cyclops bicuspidatus thomasi*  
*Cyclops vernalis*  
*Diaptomus ashlandi*  
*Diaptomus franciscanus*  
*Diaptomus novamexicanus*  
*Eurytemora affinis*  
*Epischura lacustris*  
*Epischura nevadensis*  
*Scottolana canadensis*

**ROTIFERS**

*Asplanchna sp.*  
*Brachionus calyciflorus*  
*Brachionus plicatilis*  
*Keratella sp.*

**AMPHIPODS**

*Caprella equilibra*

**MYSIDS**

*Neomysis mercedis*

Sources: Haertel and Osterberg, 1967; Seaman, 1977; Jones and Bottom, 1984.



TABLE 3

**LIST OF BENTHIC INVERTEBRATE TAXA  
SAMPLED FROM CATHLAMET BAY, OREGON**

---

|                                 |                                 |
|---------------------------------|---------------------------------|
| Coelenterata                    |                                 |
| <i>Hydra sp.</i>                | Amphipoda                       |
| Turbellaria                     | <i>Eogammarus spp.</i>          |
| Nemertea                        | <i>Eogammarus confervicolus</i> |
| Nematoda                        | <i>Corophium salmonis</i>       |
| Nematomorpha                    | <i>Corophium spinicorne</i>     |
| Oligochaeta                     | <i>Pontoporeia hoyi</i>         |
| <i>Vejdovskyella intermedia</i> | <i>Eohaustorius estuaris</i>    |
| <i>Limnodrilus hoffmeisteri</i> | Isopoda                         |
| <i>Ilydrilus frantzi</i>        | <i>Saduria entomon</i>          |
| Polychaeta                      | Harpacticoida                   |
| <i>Neanthes limnicola</i>       | <i>Scottolana canadensis</i>    |
| <i>Hobsonia florida</i>         | Insecta                         |
| <i>Manyunkia speciosa</i>       | Diptera adult                   |
| Gastropoda                      | Diptera pupae                   |
| <i>Lithoglyphys virens</i>      | Heleidae larvae                 |
| Bivalva                         | Chironomidae larvae             |
| <i>Corbicula manilensis</i>     | Chironomidae pupae              |
| Ostracoda                       | Trichoptera larvae              |
| <i>Limnocythera sp.</i>         | Odonata larvae                  |
| Mysidacea                       | Collembola                      |
| <i>Neomysis mercedis</i>        | Hydracarina                     |
| Cumacea                         |                                 |

---

Source: Durkin and Emmett, 1980 and Emmett et al., 1986.

TABLE 4

**SEASONAL ABUNDANCE OF BENTHIC INVERTEBRATES COLLECTED FROM  
FOUR LOCATIONS (STATIONS 42, 43, 44 AND 45) IN CATHLAMET BAY NEAR  
TONGUE POINT, 1977-1978**

| <u>Taxa</u>          | Mean number of organisms by season |                  |                 |                   |
|----------------------|------------------------------------|------------------|-----------------|-------------------|
|                      | <u>June 1977</u>                   | <u>Sept 1977</u> | <u>Dec 1977</u> | <u>March 1978</u> |
| <b>NEMERTEA</b>      |                                    |                  |                 |                   |
| <b>NERMATODA</b>     | 87.5                               | 6.1              | 4.3             | 24.8              |
| Turbellaria          |                                    |                  |                 |                   |
| <b>ANNELIDA</b>      |                                    |                  |                 |                   |
| Polychaeta           | 8.9                                | 3.3              | 1.9             | 7.5               |
| Oligochaeta          | 1,023.4                            | 182.6            | 287.6           | 256.1             |
| <b>MOLLUSCA</b>      |                                    |                  |                 |                   |
| Bivalva              | 8.4                                | 0.1              | 0.4             | 0.3               |
| <b>ARTHROPODA</b>    |                                    |                  |                 |                   |
| Ostradocoda          |                                    | 0.1              |                 | 0.1               |
| Mysidacea            | 0.5                                | 2.3              |                 | 0.3               |
| Amphipoda            | 440.5                              | 184.0            | 33.4            | 213.6             |
| Decapoda             |                                    | 0.1              |                 |                   |
| Isopoda              |                                    |                  |                 |                   |
| Cladocera            | 2.5                                | 3.5              |                 |                   |
| Copepoda             | 264.8                              | 492.9            | 793.8           | 1,888.4           |
| <b>INSECTA</b>       |                                    |                  |                 |                   |
| Diptera              | 9.9                                | 0.1              | 0.8             | 3.1               |
| Trichoptera          | 0.1                                |                  | 0.1             |                   |
| Odonata              |                                    |                  |                 | 1.8               |
| <b>OTHER</b>         |                                    |                  |                 |                   |
| Arachnida            |                                    |                  |                 | 0.1               |
| Hydracarina          |                                    |                  |                 | 0.4               |
| <b>NO./SQ. METER</b> | <b>36,793</b>                      | <b>17,505</b>    | <b>22,448</b>   | <b>47,960</b>     |

Note: two samples per location per season (eight total per season).

Source: Durkin and Emmett, 1980.

TABLE 5

**SPECIES COMPOSITION AND RELATIVE ABUNDANCE\* OF FISH CAPTURED BY  
BEACH SEINE AND BY BOTTOM TRAWL AT OR NEAR SOUTH TONGUE  
POINT, OREGON**

| <u>Common Name</u>     | <u>Scientific Name</u>            | <u>Seine</u> | <u>Trawl</u> |
|------------------------|-----------------------------------|--------------|--------------|
| <b>SALMONIDS</b>       |                                   |              |              |
| Chinook salmon         | <i>Oncorhynchus tshawytscha</i>   | xxxx         | xx           |
| Chum salmon            | <i>Oncorhynchus keta</i>          | xx           | x            |
| Coho salmon            | <i>Oncorhynchus kisutch</i>       | xxx          | o            |
| Sockeye salmon         | <i>Oncorhynchus nerka</i>         | x            | o            |
| Steelhead trout        | <i>Oncorhynchus gairdneri</i>     | x            | o            |
| Cutthroat trout        | <i>Oncorhynchus clarki clarki</i> | x            | o            |
| Mountain whitefish     | <i>Prosopium williamsoni</i>      | x            | o            |
| <b>NON-SALMONIDS</b>   |                                   |              |              |
| Pacific lamprey        | <i>Lampetra tridentata</i>        | o            | x            |
| White sturgeon         | <i>Acipenser transmontanus</i>    | o            | x            |
| American shad          | <i>Alosa sapidissima</i>          | xx           | xx           |
| Pacific herring        | <i>Clupea harengus pallasi</i>    | o            | xx           |
| Northern anchovy       | <i>Engraulis mordax</i>           | x            | x            |
| Surf smelt             | <i>Hypomesus pretiosus</i>        | x            | x            |
| Longfin smelt          | <i>Spirinchus thaleichthys</i>    | o            | xxxx         |
| Eulachon               | <i>Thaleichthys pacificus</i>     | x            | o            |
| Common carp            | <i>Cyprinus carpio</i>            | x            | x            |
| Peamouth               | <i>Mylocheilus caurinus</i>       | xxxx         | xxx          |
| Northern squawfish     | <i>Ptychocheilus oregonensis</i>  | x            | o            |
| Largescale sucker      | <i>Catostomus macrocheilus</i>    | x            | x            |
| Channel catfish        | <i>Ictalurus punctatus</i>        | x            | o            |
| Pacific tomcod         | <i>Microgadus proximus</i>        | o            | xxx          |
| Threespine stickleback | <i>Gasterosteus aculeatus</i>     | xxxx         | xxx          |
| Largemouth bass        | <i>Micropterus salmoides</i>      | x            | o            |
| Shiner perch           | <i>Cymatogaster aggregata</i>     | xx           | xxx          |
| Pile perch             | <i>Rhacochilus vacca</i>          | x            | o            |
| Staghorn sculpin       | <i>Leptocottus armatus</i>        | xx           | xxxx         |
| Prickly sculpin        | <i>Cottus asper</i>               | xx           | xxxx         |
| Starry flounder        | <i>Platichthys stellatus</i>      | xxxx         | xxxx         |

\* Relative abundance classified as absent (o), present (x), common (xx), abundant (xxx) and very abundant (xxxx). Fish were sampled weekly by the Service at five sites seined during May-August 1979 (Olhausen, 1980) and at seven seined during March-August 1981 (Cates, 1983). The National Marine Fisheries Service seined one site on a monthly basis during February 1980 - July 1981 (McCabe, 1991b), and used a bottom trawl to sample demersal fishes at one site on a monthly basis during November 1983 - October 1985 (McCabe, 1991a).

TABLE 6

**WILDLIFE SPECIES OBSERVED AND EXPECTED AT SOUTH TONGUE POINT:  
REPTILES AND AMPHIBIANS**

---

| <u>Common Name</u>       | <u>Scientific Name</u>        |
|--------------------------|-------------------------------|
| Common gartersnake *     | <i>Thamnophis sirtalis</i>    |
| Cope's giant salamander  | <i>Dicamptodon copei</i>      |
| Northwestern gartersnake | <i>Thamnophis ordinoides</i>  |
| Olympic salamander       | <i>Rhyacotriton olympicus</i> |
| Pacific treefrog         | <i>Hyla regilla</i>           |
| Racer                    | <i>Coluber constricta</i>     |
| Rough-skinned newt       | <i>Taricha granulosa</i>      |

---

\* Evidence of presence by sign or sighting; all others are possible residents or migrants.



TABLE 7

**WILDLIFE SPECIES OBSERVED AND EXPECTED AT SOUTH TONGUE POINT:  
BIRDS**

---

| <u>Common Name</u>         | <u>Scientific Name</u>            |
|----------------------------|-----------------------------------|
| American coot              | <i>Fulica americana</i>           |
| American crow *            | <i>Corvus brachyrhynchos</i>      |
| American green-winged teal | <i>Anas crecca</i>                |
| American peregrine falcon  | <i>Falco peregrinus anatum</i>    |
| American robin *           | <i>Turdus migratorius</i>         |
| Bald eagle *               | <i>Haliaeetus leucocephalus</i>   |
| Bank swallow               | <i>Riparia riparia</i>            |
| Barn swallow *             | <i>Hirundo rustica</i>            |
| Bewick's wren              | <i>Thryomanes bewickii</i>        |
| Belted kingfisher *        | <i>Ceryle alcyon</i>              |
| Black-capped chickadee *   | <i>Parus atricapillus</i>         |
| Black scoter               | <i>Melanitta nigra</i>            |
| Brant's cormorant *        | <i>Phalacrocorax penicillatus</i> |
| Brown-headed cowbird       | <i>Molothrus ater</i>             |
| Brown pelican              | <i>Pelecanus occidentalis</i>     |
| Bufflehead                 | <i>Bucephala albeola</i>          |
| Canada goose *             | <i>Branta canadensis</i>          |
| Canvasback                 | <i>Aythya valisineria</i>         |
| Caspian tern *             | <i>Sterna caspia</i>              |
| Cliff swallow              | <i>Petrochelidon pyrrhonota</i>   |
| Common goldeneye           | <i>Bucephala clangula</i>         |
| Common merganser *         | <i>Mergus merganser</i>           |
| Common raven *             | <i>Corvus corax</i>               |
| Cooper's hawk              | <i>Empidonax traillii</i>         |
| Double-crested cormorant * | <i>Phalacrocorax auritus</i>      |
| Downy woodpecker           | <i>Picoides pubescens</i>         |
| Dunlin *                   | <i>Calidris alpina</i>            |
| Fox sparrow                | <i>Passerella iliaca</i>          |
| Glaucous gull *            | <i>Larus hyperboreus</i>          |
| Glaucous-winged gull *     | <i>Larus glaucescens</i>          |
| Great blue heron *         | <i>Ardea herodias</i>             |
| Great horned owl           | <i>Bubo virginianus</i>           |
| Greater scaup              | <i>Aythya marila</i>              |
| Green-winged teal          | <i>Anas crecca</i>                |
| House finch                | <i>Carpodacus mexicanus</i>       |
| House wren                 | <i>Troglodytes aedon</i>          |

---

TABLE 7 (cont'd)

**WILDLIFE SPECIES OBSERVED AND EXPECTED AT SOUTH TONGUE POINT:  
BIRDS**

---

| <u>Common Name</u>       | <u>Scientific Name</u>           |
|--------------------------|----------------------------------|
| Killdeer                 | <i>Charadrius vociferus</i>      |
| Least sandpiper          | <i>Calidris minutilla</i>        |
| Lesser scaup             | <i>Aythya affinis</i>            |
| Long-billed marsh wren   | <i>Cistothorus palustris</i>     |
| Mallard *                | <i>Anas platyrhynchos</i>        |
| Northern pintail         | <i>Anser acuta</i>               |
| Oregon dark-eyed junco   | <i>Junco hyemalis</i>            |
| Osprey *                 | <i>Pandion haliaetus</i>         |
| Pelagic cormorant *      | <i>Phalacrocorax pelagicus</i>   |
| Pied-billed grebe        | <i>Podilymbus podiceps</i>       |
| Purple finch             | <i>Carpodacus purpureus</i>      |
| Red-breasted merganser   | <i>Mergus serrator</i>           |
| Red-tailed hawk *        | <i>Buteo jamaicensis</i>         |
| Rough-winged swallow     | <i>Stelgidopteryx ruficollis</i> |
| Ruby-crowned kinglet     | <i>Regulus calendula</i>         |
| Ruddy duck               | <i>Oxyura jamaicensis</i>        |
| Sanderling *             | <i>Calidris alba</i>             |
| Savanna sparrow          | <i>Passerculus sandwichensis</i> |
| Song sparrow             | <i>Melospiza melodia</i>         |
| Spotted sandpiper        | <i>Actitis macularia</i>         |
| Surf scoter *            | <i>Melanitta perspicillata</i>   |
| Tree swallow             | <i>Iridoprocne bicolor</i>       |
| Tufted duck              | <i>Aythya fuligula</i>           |
| Tundra swan              | <i>Cygnus columbianus</i>        |
| Turkey vulture *         | <i>Cathartes aura</i>            |
| Varied thrush *          | <i>Ixoreus naevius</i>           |
| Western grebe *          | <i>Aechmophorus occidentalis</i> |
| Western gull *           | <i>Larus occidentalis</i>        |
| Western sandpiper *      | <i>Calidris mauri</i>            |
| White-crowned sparrow    | <i>Zonotrichia leucophrys</i>    |
| Wilson's warbler         | <i>Wilsonia pusilla</i>          |
| Wood duck                | <i>Aix sponsa</i>                |
| Yellow-bellied sapsucker | <i>Sphyrapicus varius</i>        |
| Yellow warbler           | <i>Dedroica coronata</i>         |

---

\* Evidence of presence by sign or sighting; all others are possible residents or migrants.

TABLE 8

**WILDLIFE SPECIES OBSERVED AND EXPECTED AT SOUTH TONGUE POINT:  
MAMMALS**

---

| <u>Common Name</u>    | <u>Scientific Name</u>        |
|-----------------------|-------------------------------|
| Black-tailed deer *   | <i>Odocoileus hemionus</i>    |
| Bobcat                | <i>Felis rufus</i>            |
| Cougar                | <i>Felis concolor</i>         |
| Coyote                | <i>Canis latrans</i>          |
| Deer mouse            | <i>Peromyscus maniculatus</i> |
| Mink                  | <i>Mustela vison</i>          |
| Moles                 | <i>Talpidae</i>               |
| Mountain beaver       | <i>Aplodontia rufa</i>        |
| Muskrat *             | <i>Ondatra zibethica</i>      |
| Nutria *              | <i>Myocastor coypus</i>       |
| Opposum               | <i>Didelphis virginiana</i>   |
| Raccoon               | <i>Procyon lotor</i>          |
| River otter           | <i>Lutra canadensis</i>       |
| Shrews                | <i>Soricidae</i>              |
| Striped skunk         | <i>Mephitis mephitis</i>      |
| Voies                 | <i>Cricetidae</i>             |
| Western spotted skunk | <i>Spilogale sracilis</i>     |

---

\* Evidence of presence by sign or sighting; all others are possible residents or migrants.

**APPENDIX C**  
**WETLAND MITIGATION PLAN**



## WETLAND MITIGATION PLAN

The following wetland mitigation plan is being reviewed by the Corps and the Division as part of the Section 404 and Removal/Fill Permit processes. The mitigation plan may be revised through that process.

To compensate for the loss of 0.57 acres of wetland fill, the Division proposes to create 0.82 acres of intertidal wetland on the north side of South Tongue Point (Figure 1). The irregular shape of the mitigation area is necessary to avoid large alder trees, as well as to achieve a natural appearance in the design. The system was also designed to allow flow through the area during high tide. In addition to supplying the hydrology, this tidal flow would carry a replenishing seed supply into the created wetland area. The fact that the site is a spoil island which had minor amounts of herbaceous plantings for stabilization purposes, but now has a nearly closed canopy of red alder with a very diverse understory, indicates that the mitigation effort has a very high probability of producing a functional wetland in a few years.

The open area on the south side of the mitigation area is vegetated with European beachgrass and Scot's broom. The fringes of the area are vegetated with red alder and slough sedge.

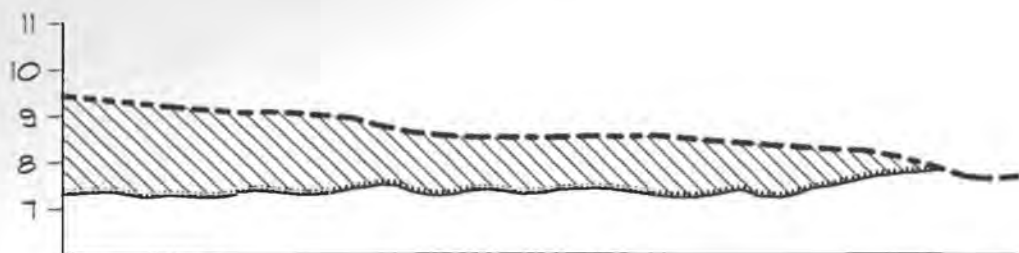
Mulch from those wetland areas proposed to be filled will be placed in the graded mitigation area to supply the area with a seed source. In addition, 20 balsam cottonwood seedlings will be planted within the mitigation area.

During construction, excavation will take place in upland areas farthest away from the wetland edge, but working toward the existing wetland limits. Upon completion of all internal excavation, the new wetland area will be connected with the existing intertidal areas by breaking down the remaining berms, after the settlement of silts in any water trapped behind the berms. This will serve to keep turbidity in the estuary to a minimum.

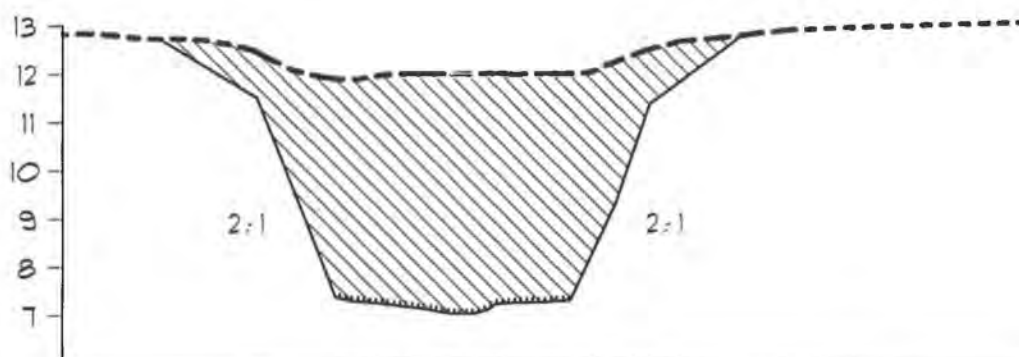
### Mitigation Goals

The goals of the mitigation effort must be designated to determine whether or not the project has been successful, and to have criteria which can help in deciding if and when to initiate remedial action in the event of mitigation failure. The goals are as follows:

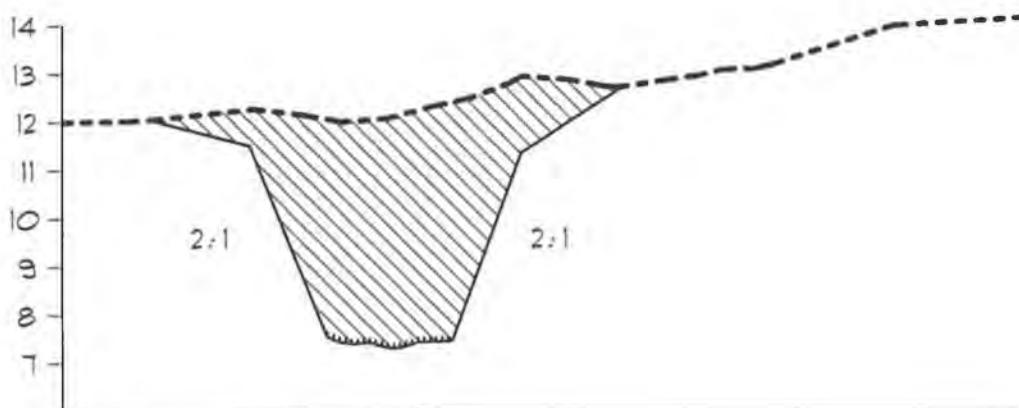
1. At the end of the first year, the effort will be deemed successful up to that point if creek bank stabilization, survival of 15 of the 20 planted cottonwoods, and at least 50 percent vegetative coverage of the mulched bottom of the tidal area, as estimated visually, is achieved;



**SECTION A' - A**



**SECTION B - B'**



**SECTION C - C'**

**NOTES FOR SECTIONS**

VERTICAL SCALE: 1" = 4'

HORIZONTAL SCALE: 1" = 20'

DATUM = M.L.L.W.

**LEGEND FOR SECTIONS**

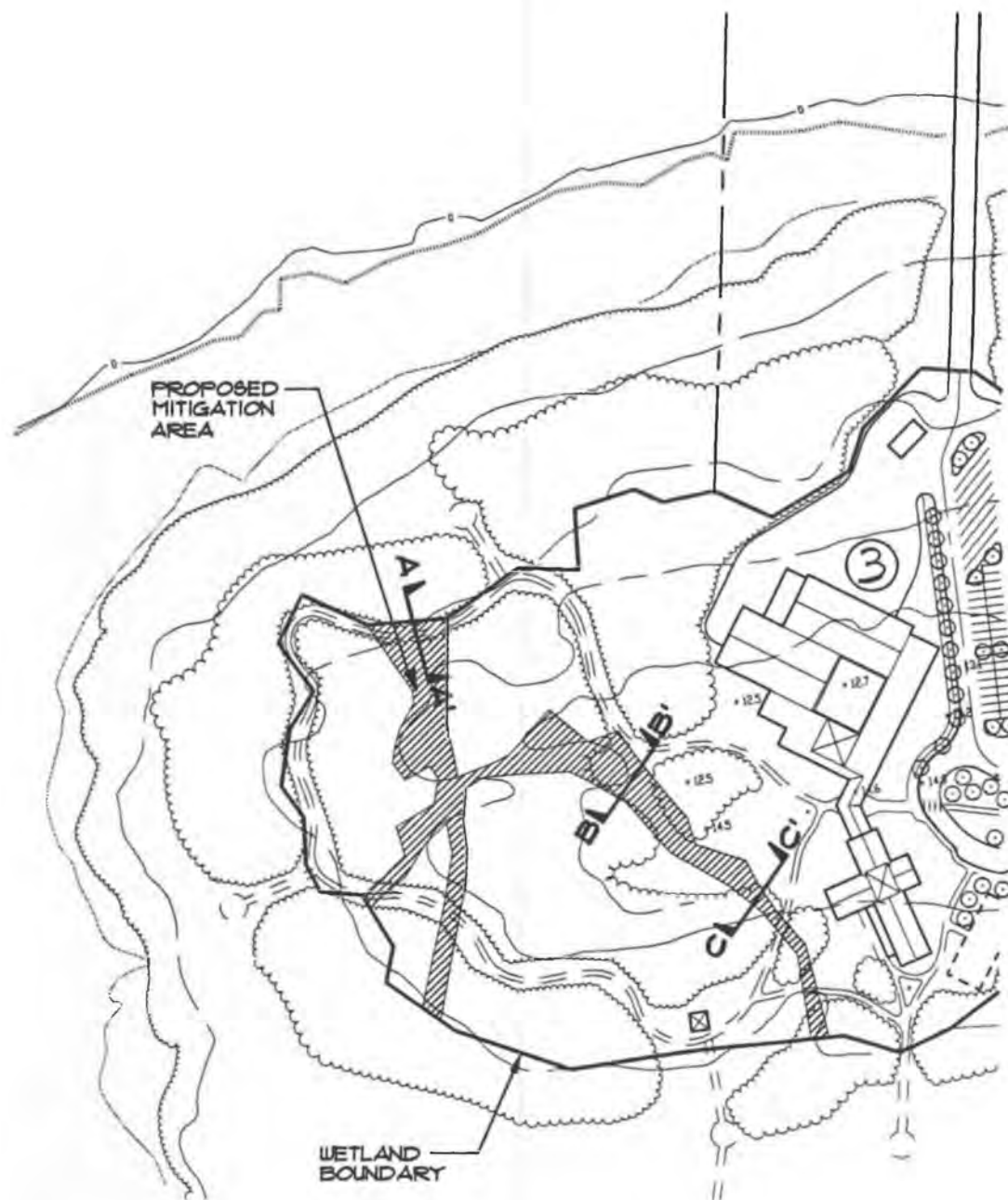
EXISTING GRADES   
PROPOSED GRADES 

CUT AREAS



MULCH FROM  
FILL AREAS





0 100 200 400  
SCALE: 1" = 200'



**Figure 1**  
**WETLAND MITIGATION**  
**PLAN AND**  
**CROSS SECTIONS**  
**SOUTH TONGUE POINT EIS**  
June 19, 1992

2. At the end of the second year, at least 60 percent coverage by desirable species, continued stability of the creek banks is evident, and survival of 12 of the cottonwoods is evident; and
3. At the end of year three, the mitigation effort shall be deemed successful if a 70 percent coverage of the mitigation area by desirable species is achieved, when measured as above, with no more than 15 percent coverage of undesirable invasive species. Undesirable invasive species are plants that are not native to the site vicinity, and have the ability to dominate the vegetation to the exclusion of other native species; examples of undesirable invasive species include Himalayan blackberry (*Rubus discolor*), Scot's broom, and reed canarygrass (*Phalaris arundinacea*). Additionally, 10 cottonwoods must still remain viable.

### Construction Sequence

Five tasks have been recognized for implementing the proposed mitigation plan. These tasks include: (1) a pre-construction meeting; (2) excavation; (3) inspection of final grades; (4) planting and laying of top soil; and (5) a post-construction meeting. A pre-construction meeting would be held on-site with the construction contractor, a wetland ecologist, and any other appropriate involved personnel. During this meeting, the site conditions and mitigation plan would be reviewed. This would allow all parties to understand the intent of the plan and to ensure that all specified materials and conditions would be met. The grading and mulch spreading would be done with a small bulldozer or by hand, whichever is least disruptive to the surrounding area. Balsam cottonwood seedlings would be hand-planted. A post-construction review of the completed work would be conducted to verify that the plan was properly implemented.

### Construction Review

Because plant locations and water regimes are critically interrelated in wetland mitigation projects, and construction plans are commonly adjusted on-site, a wetland biologist, or other qualified natural resource personnel, would assist with proper implementation of the plan. The wetland biologist would work with the construction contractor through a representative of the Division in providing assistance and guidance for meeting plan specifications.

### Monitoring Program

The following monitoring plan can be accomplished by a wetland ecologist or as a learning program for the students of the Clatsop County Community College.

To ensure the successful completion and viability of the new wetland area, inspections will be conducted at a minimum of four times per year, and a report compiled annually. This program would monitor vegetation parameters and wildlife usage for a period of three years and include



recommendations for removal of undesirable invasive species to preclude dominance of any one species. Five one-meter-square quadrant plots would be permanently established in the mitigation area to monitor sedimentation and vegetation. In addition, at least five permanent photographic points would be established to provide further documentation of the changes in wetland vegetation over time. Vitality observations would be used to monitor plant communities in the remainder of the mitigation area. Vegetation sampling would be conducted annually at some time during the summer, and overall wetland observations would be conducted quarterly to coincide with the seasons. Each of the parameters to be monitored is further described below. Annual monitoring reports would be submitted to the Division.

a. Vegetation Monitoring:

Vegetation would be monitored annually during the latter half of the growing season, but within two weeks of the same time every year. Monitoring would consist of species list compilation and estimated percentage of cover of established quadrants along with wildlife observations. A total of five quadrants, each one meter square, would be established in the created wetland, spaced to sample each representative typical community. Once established, quadrants would be monitored throughout the three-year program. To supplement this information, photographs of each quadrant would be taken.

In addition, a total of five trees will be assessed for growth by measurement at DBH (diameter breast height--4.5 feet) and by overall height from grade to end of new growth. These trees will be marked for future reference with tree tags, lumber crayon, or spray paint.

b. Hydrologic Monitoring:

During each monitoring inspection, the mitigation area will be checked for the presence of water and levels measured, if present above the surface. At the same time, soils will be checked for saturation.

c. Overview Photographic Sampling:

To supplement the sampling measurements described above, permanent overview photographic points would be established, sufficient to provide clear documentation of the entire mitigation area but not less than five panoramic photos. This would provide photographic documentation of the overall character of wetlands in the mitigation area.

### Contingency Plan

Should the proposed mitigation goals not be achieved within three years, a determination by the Division and the Corps should be made to implement the contingency plan. The contingency plan would provide for replacing plants that have not survived and for further excavation where required to provide the necessary hydrologic regimes. An assessment of the cause of mortality would be made by the monitoring biologist, and a recommendation made for species composition changes or other mutually agreeable correction measures.

